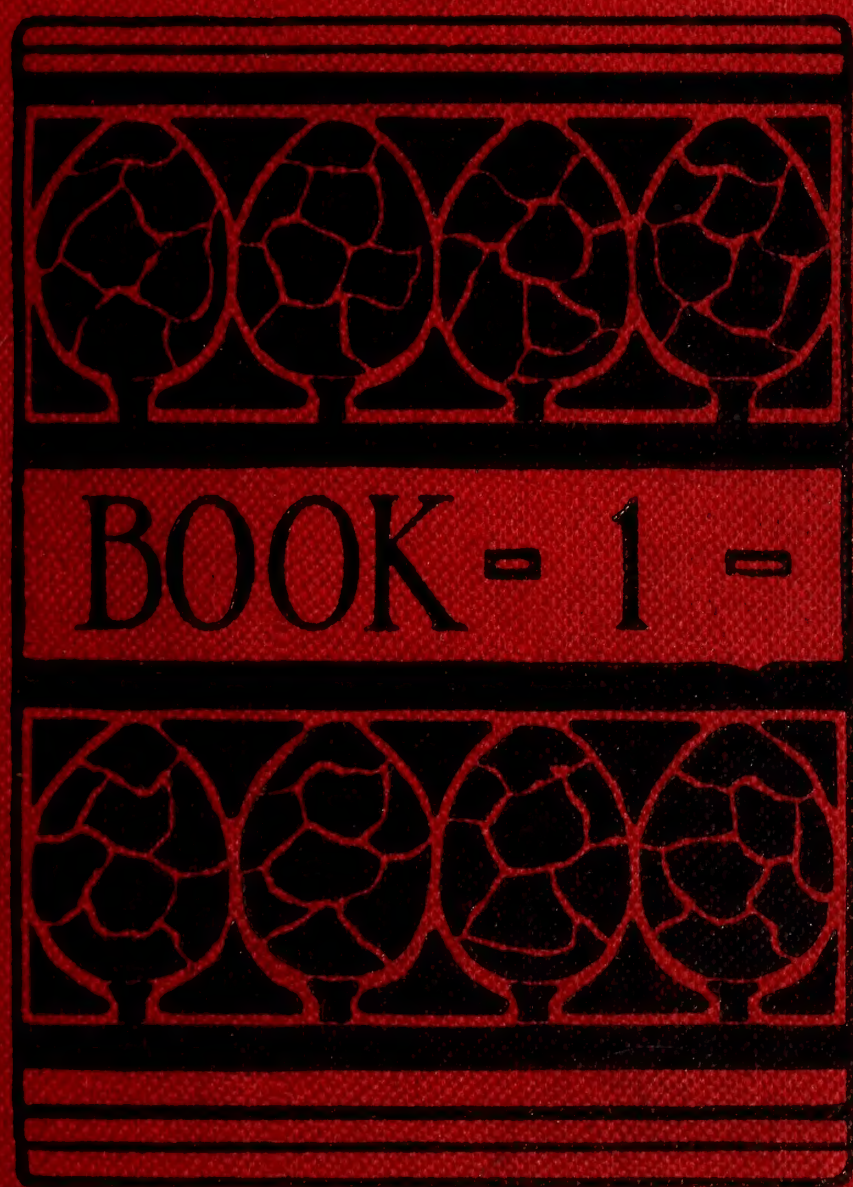


BLACKIE'S TROPICAL READERS:



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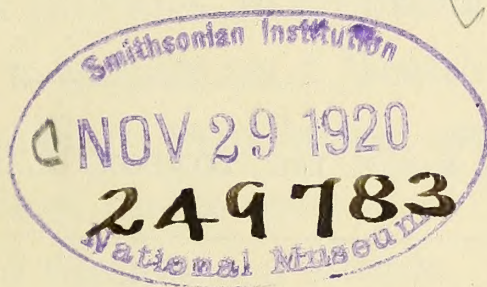
Cocoa-nut Palms.

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Tropical Readers

Book I.



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Blackie's Tropical Readers

Book I

Book II

The Senior Tropical Reader

Teachers' Companion to Books I and II.

Containing Suggestions for Experiments
and Practical Work. By E. J. WORT-
LEY, F.C.S.

BLACKIE & SON, LTD., LONDON, GLASGOW, BOMBAY

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PUBLISHERS' NOTE

The "Tropical Readers" are designed to interest school children in the familiar objects of the animal and vegetable kingdoms, and to foster habits of observation and reflection. They seek to convey, in a pleasant form, useful information upon plant-life, the cultivation of the soil, and the special treatment under which some of the important vegetable products of the tropics are obtained.

In dealing with the animal kingdom *types* of the principal orders or classes are described in the First Book, preliminary to the elementary study of the *classification* of animals, which appears in the more advanced book.

The Second Book includes, in addition to the subjects enumerated above, a section on "Health", dealing with foods, digestion, clothing, ventilation, and other conditions of healthy living; and a section on "Government".

The language and diction are simple. As far as possible difficult words have been avoided, especially in the first book, in order that the children may be free to fix attention on the facts brought under notice. Many of the chapters are written in dialogue—an attractive form for young children, and the one most helpful in securing a natural and expressive tone in reading.

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FIRST BOOK

PART I.—ANIMAL LIFE.

THE BAT.

1. “What do you think the bats are doing?” asked John’s father, as he and his son were walking out one evening, where some bats were darting about.

“I do not know, Father,” said John. “They turn first one way, then the other, as if they did did not know where to go.”

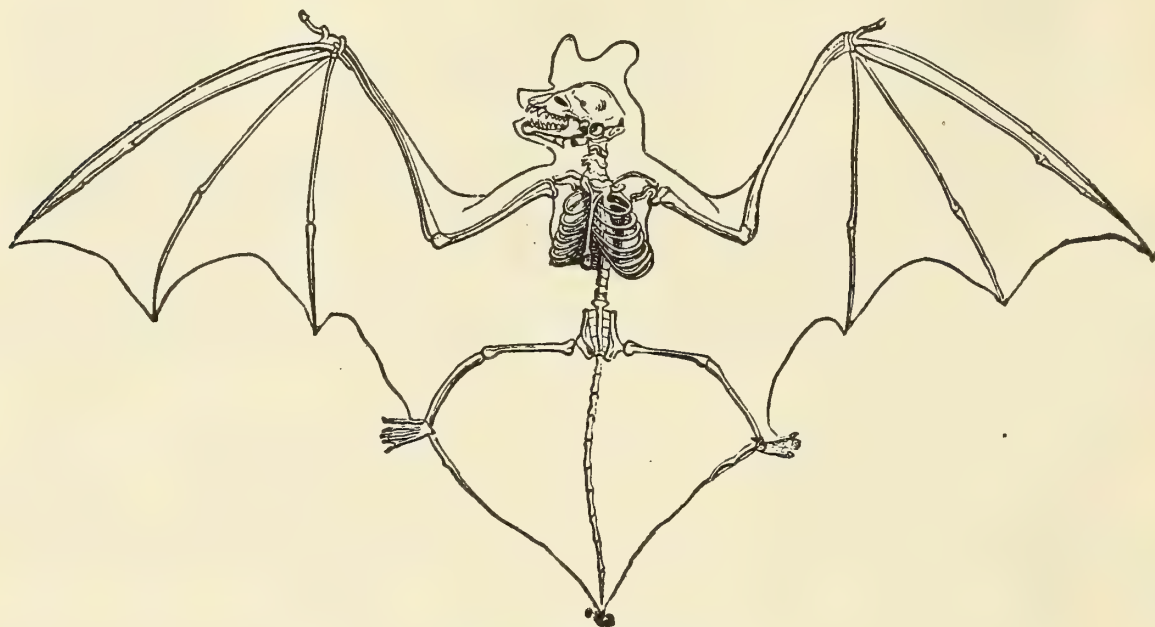
2. “They are hunting for food. All through the day they rest, and when evening comes on, they go abroad in search of moths, flies, and other insects.”

“I think they cannot see then,” said John. “Perhaps that is why they turn about so often, instead of flying straight on.”

3. “The bat does not trust to its sight, but to its hearing, and most of all to its feeling,” said John’s father. “Its long tender wings and ears warn it when anything is in the way.

4. "These wings are very curious, and not at all like a bird's wings. They have no feathers, but are formed of skin, spread out on a thin framework of bone, in something like the way silk is spread out on the ribs of an umbrella.

5. "The bat's finger-bones are drawn out to a very great length, so that the middle finger is



Skeleton of Bat.

sometimes longer than the whole body. The skin spreads not only between these long finger-bones, but also to the bat's sides, and even between its hind legs."

6. "I think the wings must be very large," said John.

"They are," replied his father. "When a bat is not using them it folds them up, as a fan is folded, and packs them against its sides.

7. "Just where the four finger-bones meet, and

where you might expect to find a thumb, you see only a little hook or claw. This the bat uses to drag itself along when on the ground, for it is a very bad walker."

8. "I should think so, with such awkward bones, and so much loose skin," said John. "What becomes of the bat in the daytime?"

9. "It rests during the day; yet it never lies down. It hangs itself up head downwards, holding on to its hiding-place by the little claws of its hind feet, and folding its wings round its body.

10. "Some bats feed on fruits, as well as on insects, and so do much harm to the crops. But we must not forget that they do good by killing insects whose eggs might hatch into grubs and caterpillars, which, as you know, are very harmful to plants and fruits."

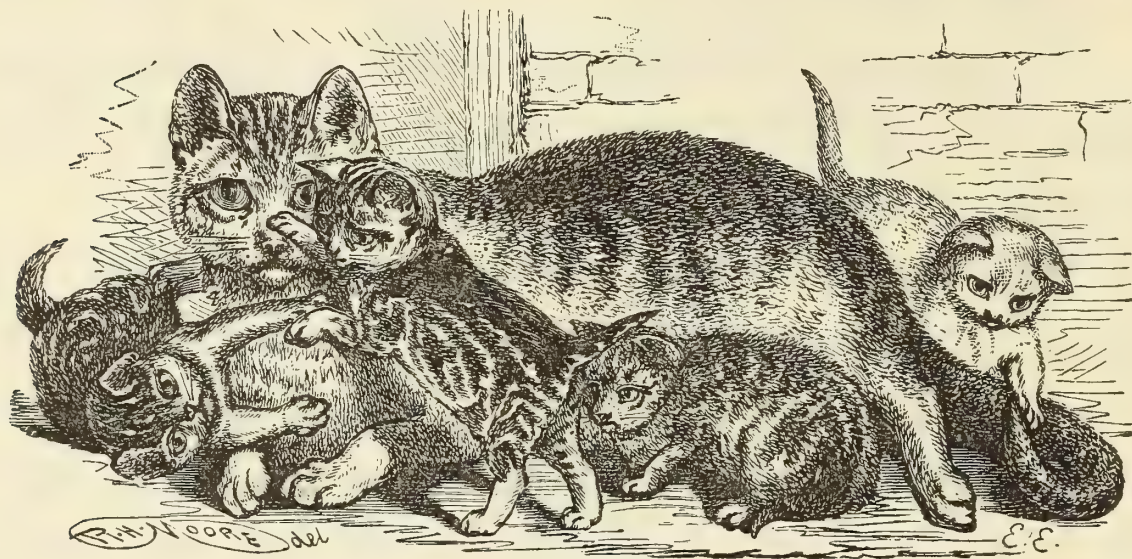
THE CAT.

1. The cat is a pet with most of us. When we stroke its smooth fur, it purrs as if to show how pleased it is.

2. Have you ever seen a cat catch a mouse or a bird? It will lie in wait a long time, ready to pounce upon some little creature that it wishes to kill; or it will creep softly along, and then,

with a sudden leap, will strike its sharp claws into its prey.

3. In the same manner, lions and tigers hunt



Cat with her Kittens.

other animals for food. They, as well as leopards and panthers, belong to the cat family, and, like the cat, they have teeth and claws just fitted for seizing and tearing flesh.



Cat's Foot showing the Claws.



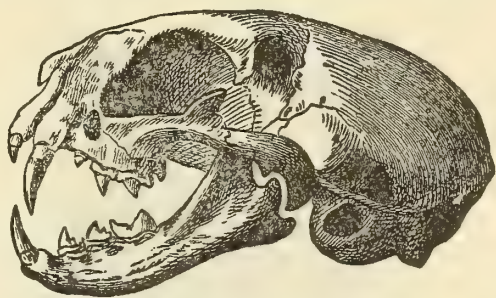
Under Side of Cat's Foot, showing the Soft Pads.

4. The next time some gentle cat jumps on your knee to be stroked, look at its paws. On the under side of them you will find

some soft pads. On these the cat can walk without making a noise, and when it springs down from any high place, they keep its feet and

legs from being jolted and hurt. Touch the pads; you will find them as smooth as velvet, and as soft as india-rubber.

5. Try to find the sharp claws with which the cat scratches, and climbs, and seizes its prey. There are five to each front foot, and four to each hind foot. You cannot always see them, for when their owner does not want to use them they are drawn back, and hidden away in their sheaths, or cases.



Skull of a Cat.

6. If you move the cat's lip aside, you will catch sight of four long, pointed teeth, which are used for tearing its food into pieces. We might tell by the shape of the teeth that the cat is a flesh eater. They are not shaped for grinding up the food, as our double teeth are.

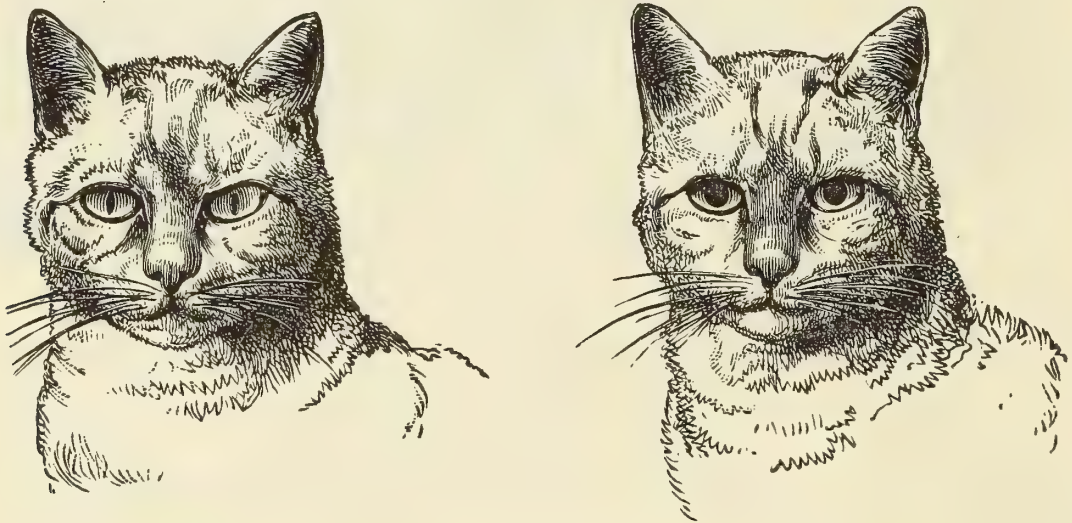
7. If the cat licks your hand you find that its tongue is dry and rough. It seems to scrape your skin. How useful such a tongue must be to the cat and to her cousins, the lions and tigers, for clearing the flesh from the bones of their prey.

8. If you look at the cat's eye when the light is bright, you will see that the middle part of it looks like a thin, dark line. This is called the

“pupil” of the eye, and the light shines through it, so that the animal can see.

9. But when there is not much light, the pupils open and become round, to let in as much of the light as possible. That is why the cat is able to seek its prey in the dusk.

10. The long whiskers are of great use to the cat, for by feeling with them, it can find out



Cat's Head, with the Pupils of the Eyes closed and open.

whether a hole is wide enough for its body to pass.

11. A cat does not follow the steps of its master or mistress as a dog does, but it becomes very fond of the house. Sometimes, when people move to a new place to live, their cat will not stay with them, but will wander back to the old home.

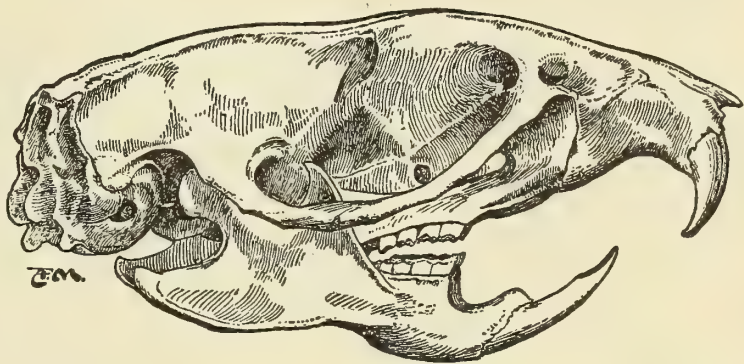
THE RAT.

1. "Look here, Will! Our dog Dash has caught a rat! What a soft coat of gray fur it has! And just look at its pretty clean feet, and its neat little claws."

2. "And what a long tail it has!" added Will.

At that moment Mr. Lane came up to the two boys, and they showed him the rat.

3. "Its mouth is not quite shut," said Mr. Lane; "so you can see its four long front teeth—two above and two below. They are curved, and have flat sharp edges like chisels. With them the rat used to gnaw its food, or bite its way through wood or other hard things."



Skull of Common Rat (natural size).

4. "As fast as these teeth were worn away at the edge, they grew up from the root, so that they were always of the right length."

"Are there any other animals with teeth like those?" asked Jack.

5. "Oh, yes!" replied Mr. Lane. "Mice, rabbits, hares, and beavers, all belong to the family of gnawing animals."

“Where do rats live, Father?” asked Will.

6. “They live in the floors, ceilings, and walls of houses, or among growing cane, or in holes which they make in the ground,” said Mr. Lane.

“And what do they eat?” asked Jack.

7. “They are very fond of corn and other seeds, as well as of fruits, and the roots and stems of plants,” said Mr. Lane. “Sometimes they rob



The Brown Rat.

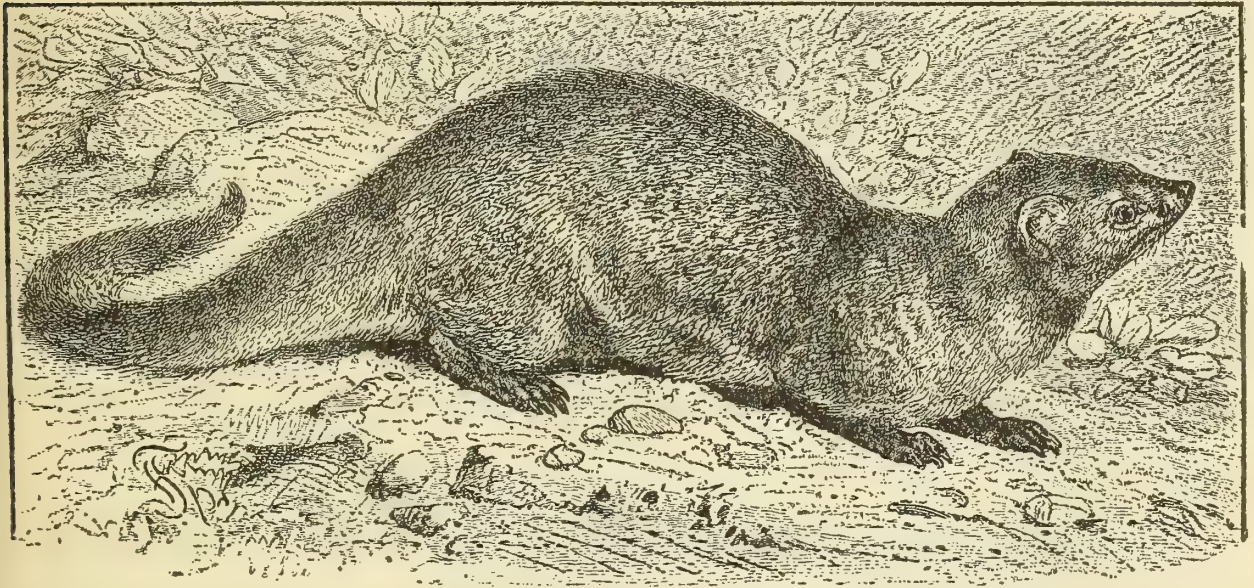
us of our eggs and chickens; or they go down to the streams, and feed on the water plants, or swim and dive to catch small fish.

8. “Rats are not all of the same kind,” Mr. Lane went on to say. “This rat which you have found is gray, but some are brown, and some are black. The brown rats are larger than the others, and are found in all parts of the world.

9. “They were brought to Jamaica many years

ago to help to kill the plantation rats, which did great harm to the crops. Soon, however, the brown rats grew so plentiful that they became a pest.

10. "The mongoose, too, was brought into the island to kill off the rats, which did so much harm to the sugar-canes. The mongoose did its work well, but in another way it did mischief. It



The Mongoose.

killed off so many of the lizards and birds that fed upon small insects and grubs, that we now have to suffer from swarms of ticks, grass-lice, and other insects.

11. "But look at the rat once more."

"It has whiskers something like those of a cat," said Will.

"Yes," said Mr. Lane. "Rats burrow in the ground, where, of course, they are in the dark,

and then their whiskers are of use to them in feeling the way.

12. "Their soft fur, too, is the best covering they can have, because the mud and water will not cling to it, as they would to stiff hairs. So the animal can keep clean even in the earth, and in the dirty places where it hides, or searches for food."

THE HORSE.

1. "I see that you are very fond of the horses, Tom. Would you like me to tell you something about them?" said Mr. Hill one day. Mr. Hill was an old friend who was on a visit to Tom's father.

2. "Yes, if you please," said Tom, "though I know something about them now. I know how to harness them, and how to feed them."

"Then, of course, you know what food they like?"

3. "Oh, yes! They like corn and grass."

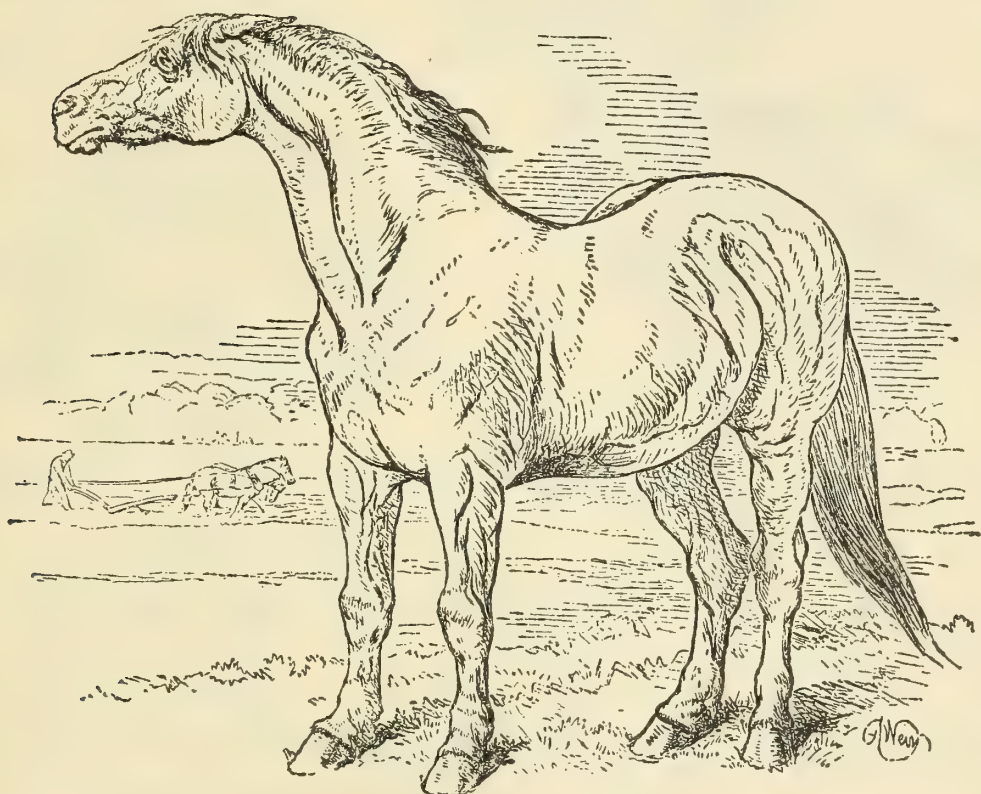
"Very well, Tom. Now come to the old horse in the pasture. I dare say he will let us look at his teeth. I want you to see that they are just fitted for the kind of food you named.

4. "In learning about the horse, you will learn about the mule and ass too; for they all belong

to the same family of animals, and are all alike useful. In hilly places the ass is very sure-footed."

5. "And it is quiet and patient too," added Tom.

"Yes," said Mr. Hill. "But here is the old horse.

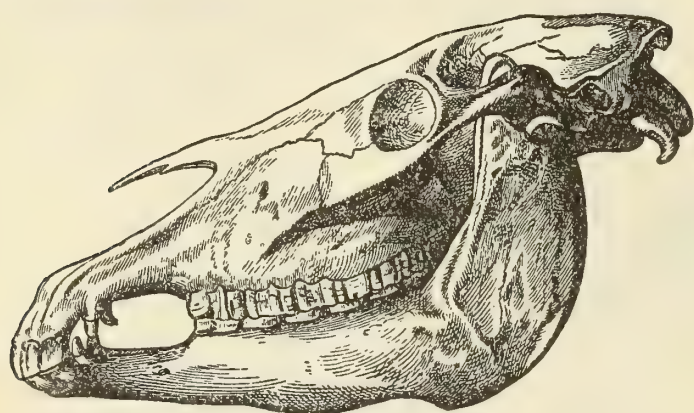


6. "Look at the front teeth," he added, as he opened the horse's mouth. "How many are there?"

"There are six sharp ones at the top, and six at the bottom," said Tom, after counting them.

7. "Those teeth are for cutting the food," said Mr. Hill. "See their straight, sharp edges. Next to the cutting teeth, you may see a small, pointed tooth on each side, in the male horse.

8. "Now look at the gap between the front and the back teeth. That is where the bit goes. Behind it, there is a row of broad, flat teeth for chewing and grinding the food. Six grinders grow on each side at the top, and the same



Skull of Horse.

number at the bottom. So there are twenty teeth in each jaw."

9. "Yes," said Tom. "I counted them as you were speaking. "Here.

Spot!" he called to his dog, who was scampering round. "Come and show *your* teeth."

"You see that Spot's teeth are not like the horse's teeth," said Mr. Hill. "That is because the dog feeds on flesh, and the horse on plant food."

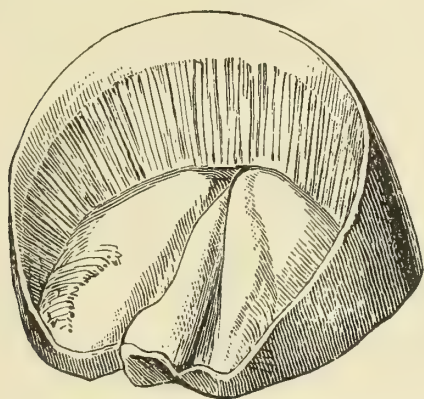
10. "And the two animals have not the same kind of feet," said Tom.

"No; the horse has hoofs. These are not split like the hoofs of cows, sheep, and goats, but are solid and single. Is it not strange that the horse has only one toe on each foot? The end of it is hidden by the large nail which forms the hoof."

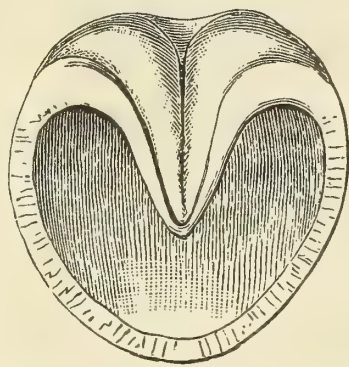
11. "The hoofs would break and wear away if iron shoes were not nailed on to them," said Tom.

“Yes,” said Mr. Hill. “But of course horses in a wild state have no shoes. Their hoofs grow to make up for what is worn away, just as your finger-nails grow.

12. “I will lift up the horse’s foot, Tom. Look at that pad in the middle of it. That is the ‘frog’. It is not hard like the hoof. When the



Horn of Hoof of Horse.



Sole of Hoof, showing Frog.

horse is not shod the frog rests on the ground, and helps to give a firm footing.”

13. “I like horses because they are so strong, and because they obey us,” said Tom.

“You speak so well of the horses, Tom, that I am sure you will always be kind to them. They deserve it, for they serve us well. They carry us on their broad backs, and draw heavy loads for us. Even when dead they are of use to us, for their hides are made into good strong leather.

14. “It is sad to think that animals are sometimes treated unkindly by men and boys. It is

both wicked and foolish to behave so. An animal that is well treated will grow fond of its master, and will work for him much better than it would if he were cruel to it."

15. "I am sure I shall always be kind to our horses," said Tom. "I grow fonder of them every day, and they know my voice quite well."

"That's right," said Mr. Hill. "And always remember the horse's song, as I may call it:

‘Down a hill, trot me not,
Up a hill, gallop me not;
On the level, spare me not;
In the stable, forget me not’.

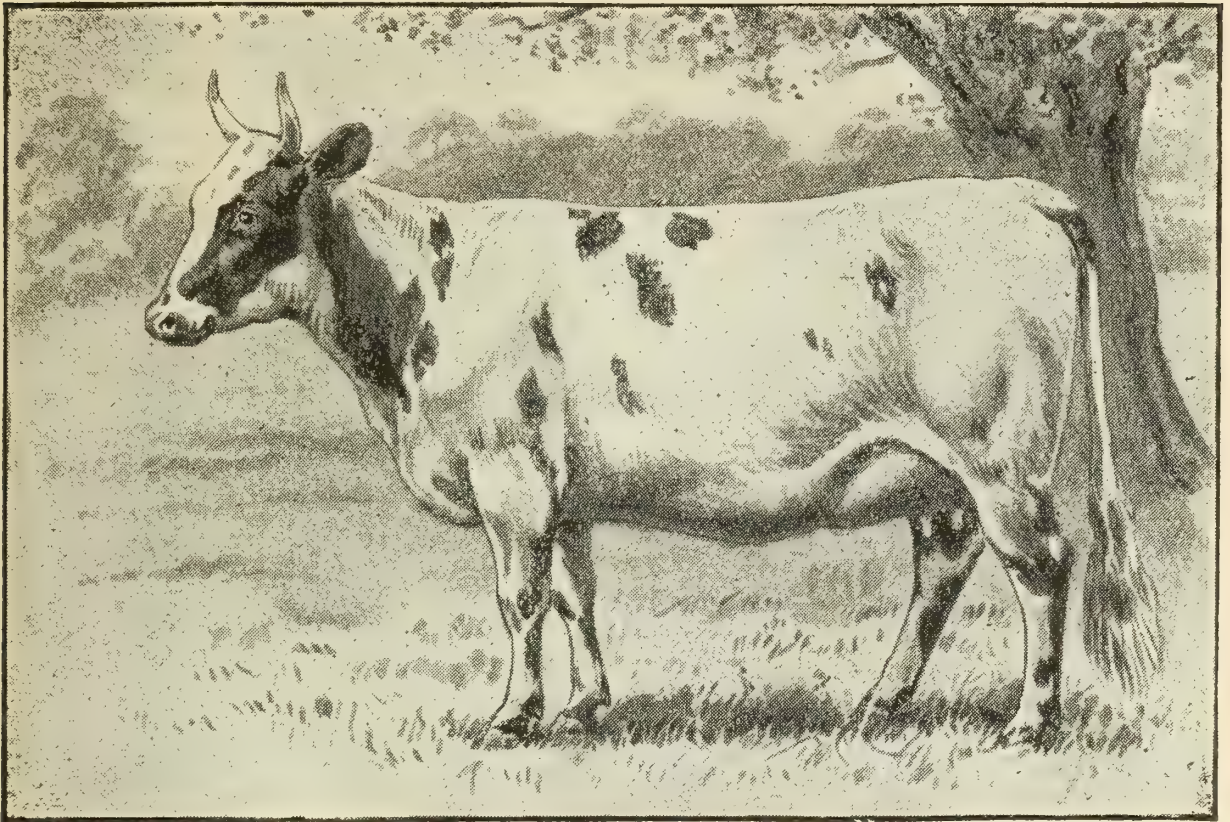
THE COW.

1. I do not think you can name any creature that is of so much use to man as oxen and cows. We use oxen to work for us in our fields, and from cows we get rich milk.

2. We also eat the flesh of cattle, tan their hides to turn them into leather, make knife handles and many other things of the bones and horns, turn the hoofs into glue, use the fat in making candles, and put the hair into mortar or plaster.

3. You have seen cows and oxen so often that

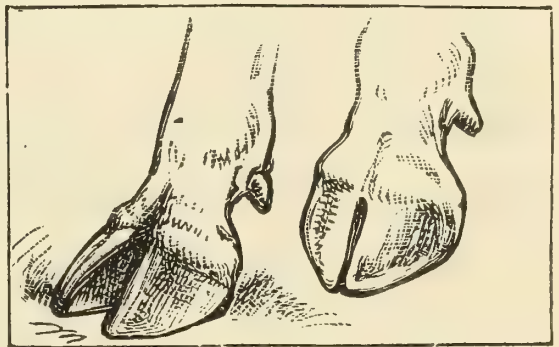
perhaps you know what their feet are like. They are hoofed; but the hoof is not round and in one



Ayrshire Cow.

piece like that of the horse. It is split, or “cloven”, so that part of it covers one toe, and part another.

4. At the back of the foot there are two other short toes which do not touch the ground. So you see that cows have four toes on each foot, as the sheep and pigs have.



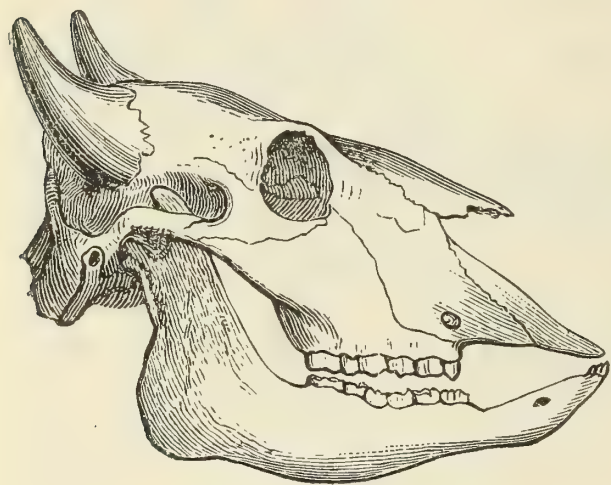
Hoof of Cow.

5. We shall not expect to find that the cow has long and pointed teeth, for we know that she does

not feed on flesh. She has large, flat teeth on each side for chewing, and in the lower jaw there are eight front teeth.

6. She has no teeth in the front of her upper jaw, but only a hard pad. When she crops the grass she presses it between her lower front teeth and the pad, and tears it away. Then she swal-

lows the grass without chewing it.



Skull of Cow.

7. After a time, when she lies down to rest, she passes the food back into her mouth, a little at a time, to be well chewed. This is called *chewing the cud*. Have

you not often seen a cow with her mouth working—chew, chew, chew,—just as if she were eating. She was “chewing the cud” then.

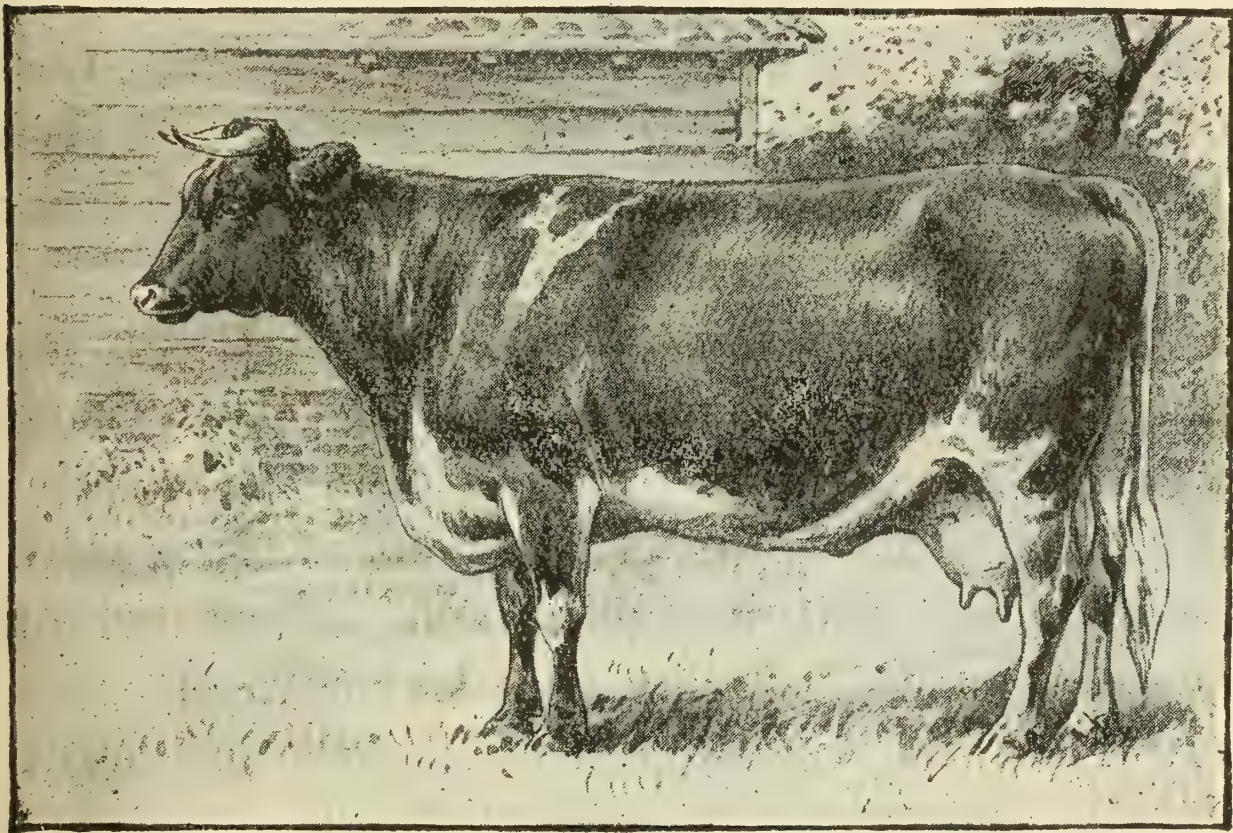
8. The cow is not the only animal that chews the cud. Sheep, goats, deer, and camels do the same, and they also have cloven hoofs.

When we speak of *grazing* land, we mean that which is set apart for cattle to feed or *graze* upon.

9. In Jamaica more than half the land which is at present attended to, is used for grazing. The hills are clothed with rich feeding-grass, and

on the more level lands there is plenty of guinea grass, which the cattle turn into fine juicy beef.

10. The pen-keepers rear and tend many kinds of cattle. Some of them are best for the planter, who uses them for drawing loads; others, such



Shorthorn Cow.

as “Short-horns”, are best for the butcher, who wishes for good beef; others again, such as the “Ayrshires”, are best for the dairyman, who needs cows that give plenty of good milk.

MILK AND BUTTER.

1. One day I was out with Uncle Tom, looking on while his cows were being milked.

“How would you like to live on milk, and never have meat, Jack?” he asked me.

2. “Not at all, Uncle,” I said; “perhaps I should not grow if I did not eat meat.”

“Oh, yes! you would,” he said. “With plenty of milk and bread you would get on well. A baby, a calf, and many other young animals have nothing besides milk to eat or drink, for a time. It is the best food for them, and is good for us all.”

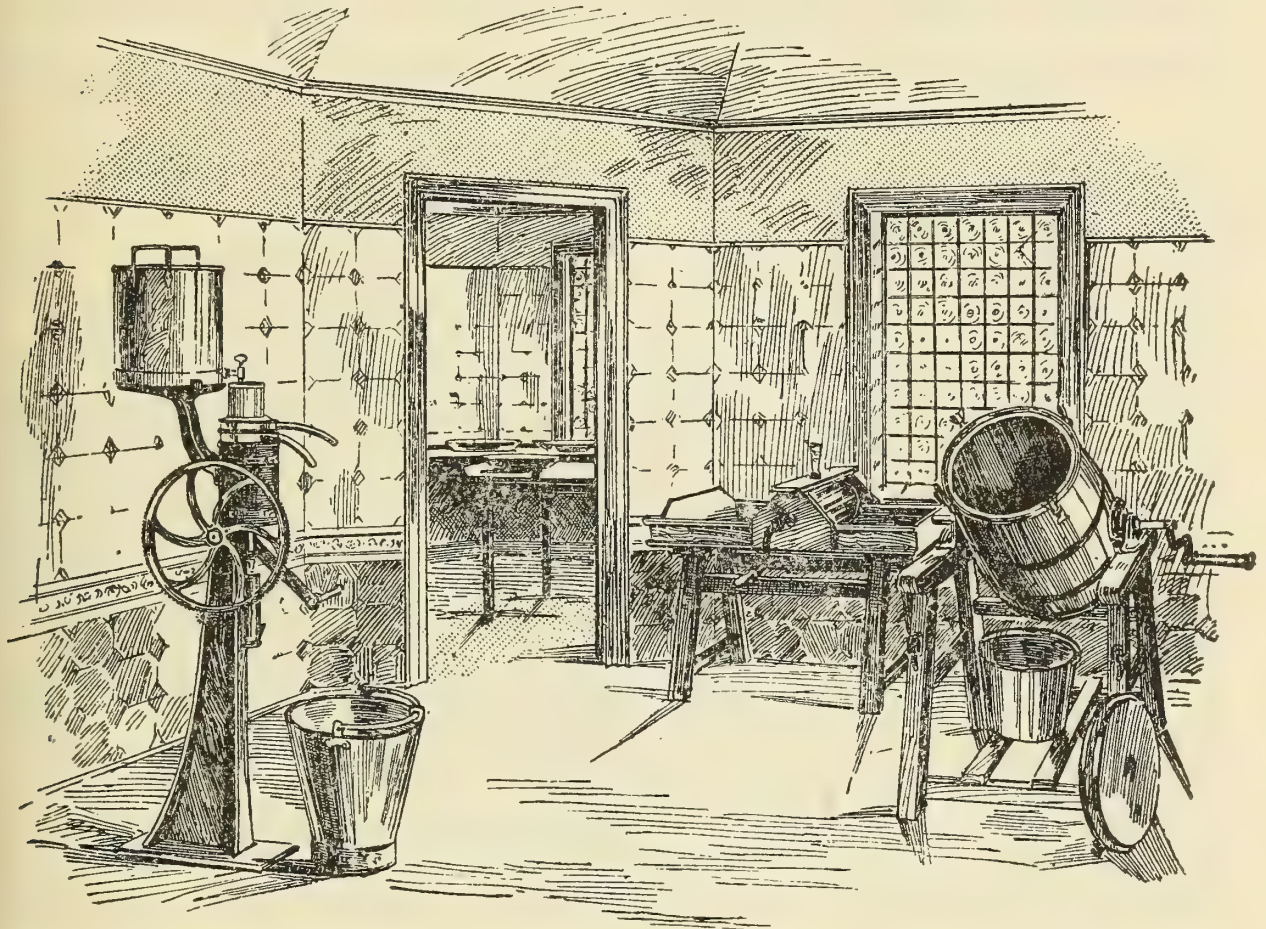
3. I thought it very strange when Uncle told me why milk is white, so that we cannot see through it, as we can through water. He said it is because milk is full of tiny bags of oil or fat.

Then he told me all about butter-making. Would you like to read what he told me?

4. Of course the little fat-bags are at first mixed up with the watery part of the milk. But fat is lighter than water, and will float on it. So if the milk is left for a time in a dish, the fat-bags rise to the top, and form cream, which can be skimmed off, and made into butter.

5. The cream has to be put into a churn, which is then turned round and round, so as to dash the cream about. In this way the thin skins or bags are burst, and the fat is let out. This fat is the butter, and the watery part that is left is called butter-milk.

6. The butter must be well washed with cold water to wash away the little skins. If they were left, they would decay, and the butter would not be good to eat. Of course the water does



Cream separator.

Butter worker.

Churn.

A Dairy.

not wash away the butter too, for you know that fat and water will not mix together.

7. Uncle said that milk must never be put into any pan or basin that is not quite clean, or it will lose its sweetness, and turn bad.

8. He showed me how anything sour will turn the milk. Into a small glass of milk he squeezed the juice from a lemon. In a moment I saw the

milk change. It turned lumpy, and was no longer all liquid. Uncle said that the sour juice had curdled it.

9. He called the thin watery part *whey*, and the solid part *curds*, and told me that in other countries cheese is made from the curds of milk.

THE MANATEE, OR SEA-COW.

1. The manatee is a strange-looking creature, whose home is in the sea and wide river-mouths. You must not mistake it for a large fish, although its body is shaped something like one, and it can swim well.

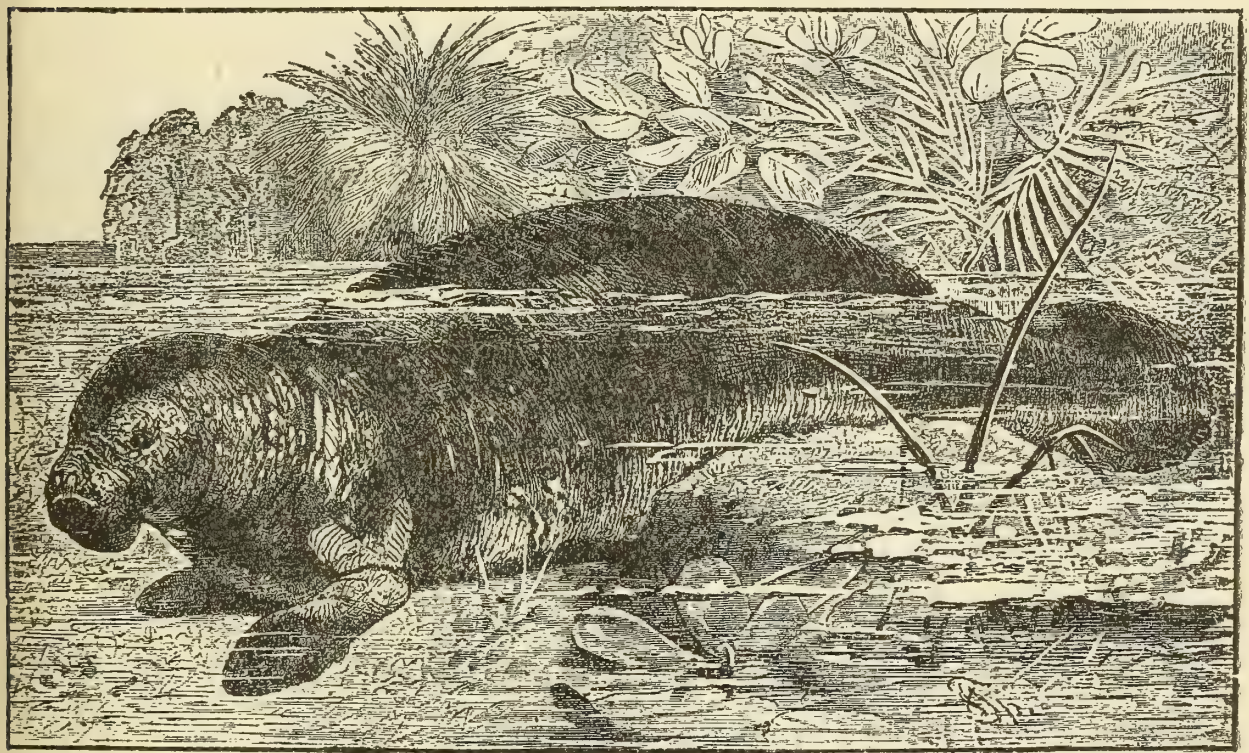
2. In many ways it is not at all like a fish. The blood is warm in the sea-cow, but is cold in a fish. The sea-cow does not breathe by gills as a fish does, but by lungs, as we do. And it feeds its young upon milk, which, as you know, fishes never do.

3. Its body is not covered with scales, but with a black, uneven skin, which is tough and hard, with a few short stiff hairs growing on it.

4. Although the sea-cow's tail is shaped like a large fin, it is not like a fish's fin, for it is not spread out upon ribs, or "rays", and it lies flat, or crossways, instead of being upright like the tail-fin of a fish.

5. The sea-cow has no legs, but it has a pair of short fore-limbs, in the shape of flippers, or paddles. These are fitted with nails, by which the creature can drag itself along to search for plants to eat.

6. We cannot call the sea-cow a pretty animal. Its head, which is rounded, is so closely set to



Manatee, or Sea-cow.

its body that there seems to be no neck. It has no ears, and although it is so large, it has very small eyes.

7. And what kind of teeth has it? Teeth, as you know, are always fitted for the food an animal takes. Now, the sea-cow is not a flesh-eater, so it has no long, pointed teeth, like those of the dog and cat. Nor has it even any cutting teeth, except when very young.

8. Instead of these, in the front part of the mouth there are thick hard pads, bearing short bristles. By means of these the sea-cow seizes and tears off the water-weeds on which it feeds. At the side, each jaw has square grinding teeth, for chewing the food.

9. As the manatee breathes by lungs, at times it must rise above the top of the water to take in the air. In its manner of breathing it is thus like the whale, which is the largest animal in the world.

THE DUCK.

1. “Quack, quack!” cries the duck. If it could talk to you I fancy it might say :

“Just look at my little ducklings as they swim with me. I did not teach them to do it. They knew the way to do that the moment I brought them to the water.

2. “Look at my feet. See how I spread them out in the water, to drive myself along. There is a skin between my toes, and that is why men call me ‘web-footed’.

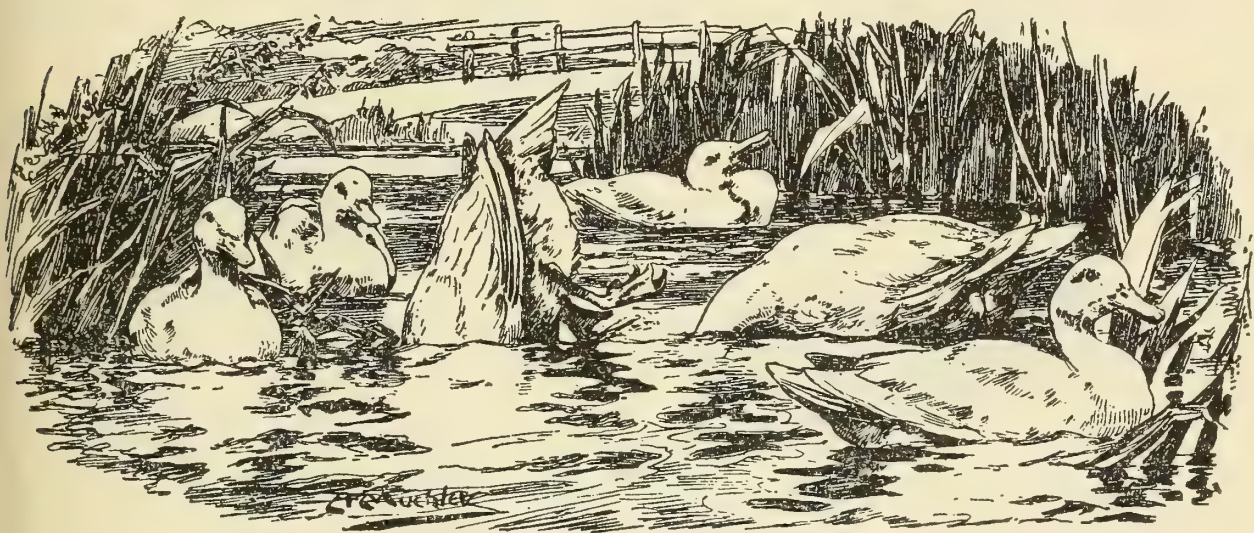
3. “All swimming birds have webbed feet like mine. Have you not seen the feet of my friends, the geese?

“Some water-birds cannot swim as I can, but

they can wade in the water, for their legs are very long.

4. “Birds that live on the land do not have webbed feet; their toes are made for scratching, perching, or climbing.

5. The hen cannot swim, but she can scratch in the ground for food, and I cannot. I do not



Ducks diving for Food.

walk well, either; I only waddle. But I can fly. So you see that I can live on land, or up in the air, or on the water.

6. “Ah! there is a snail on the mud. See me dive for it. Down I go!

“Here I am again! I often dive so for my food. Sometimes I eat the tender plants that grow in the water.

7. “Look at my broad bill. It is just the right shape for getting my food out of the soft mud. I fill it full of mud and water, that I may

get insects and other food. There is a kind of fringe round my bill, and this lets the water drain out, but keeps the food in.

8. "I am a tame duck, and I have lived near this pond all my life. But some ducks are wild, and live in large flocks. Some of them even swim on the rough sea.

9. "Perhaps you think that I am very wet.



Head and Foot of Duck.

Not at all! When I am tired of swimming, which will not be for a long time yet, I shall go on the bank and shake off the water.

10. "There is some oil on my feathers which keeps them from getting soaked, and I can dress them with fresh oil whenever I please. A thick coat of soft down covers my body, and protects it from the water.

11. "I have plenty to make me happy, you see. But one thing makes me sad. Sometimes one of my sisters is caught by the man who throws food to us; and we never see her again. The old

drake told me that the man eats her, and saves her soft feathers for stuffing pillows. I hope he may not catch me!

12. "Good-bye now! I must look about for food for my ducklings."

LIZARDS.

1. "Here is one! I have caught it!" shouted Tom Smith to his brother Will.

Will ran to the spot, where Tom had just caught a small lizard as it was gliding away amongst the ferns and fallen leaves.

2. "Come here, Nell," they cried to their sister, who was in the garden. "Now we can tell you all about a lizard, just as our teacher told us to-day. You can see for yourself what it is covered with."

3. "Anyone knows that, of course," said Nell. "It is covered with a hard skin, but it has neither hair nor feathers."

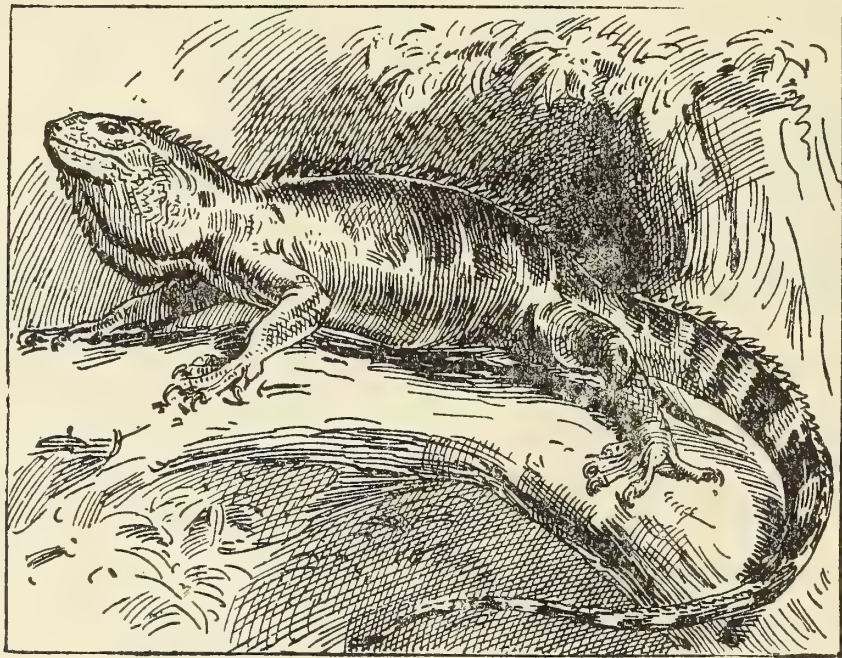
4. "Ah! but you don't know all," said Tom. "Its skin has scales; not loose scales like those of fishes, but closely-fitting ones, which feel quite hard when you touch them."

5. "Lizards are reptiles," said Will; "so are crocodiles and alligators. But in those large

creatures the scales are like strong, horny plates, and so hard that often a bullet will bound off from them instead of piercing a hole."

"When you touch a lizard it doesn't feel very warm, as a cat or a bird does," said Nell.

6. "That is because its blood is not warm, like theirs is," said Will. "Teacher says that a rep-



Ring-tailed Iguana—one of the Lizard family.

tile is a cold-blooded animal. The warm-blooded animals mostly have hairs or feathers to keep in the warmth.

7. "Let the lizard run. There, Nell: do you know why it can twist and bend its body, to turn from side to side? It is because its long backbone has so many joints in it."

"What pretty feet it has!" said Nell, as she looked at the neat little toes spread out on the ground.

8. "Yes," said Tom. "This one has four feet; but there are lizards with only two feet, and some with none at all."

"What does it eat?" asked Nell.

"Flies and insects," replied Will. "It has sharp, pointed teeth, but it will not hurt us."

CROCODILES.

1. "You would not like to have the teeth of an alligator or a crocodile near you," said Tom.

2. "No; I should have a poor chance of life then," said Will. "Think what big creatures they are. Teacher said some of them are twelve feet long."

3. "Father has seen the crocodiles in the Black River, in St. Elizabeth. Some people call them alligators, but it is easy to make a mistake in the name, because there is not much difference between alligators and crocodiles."

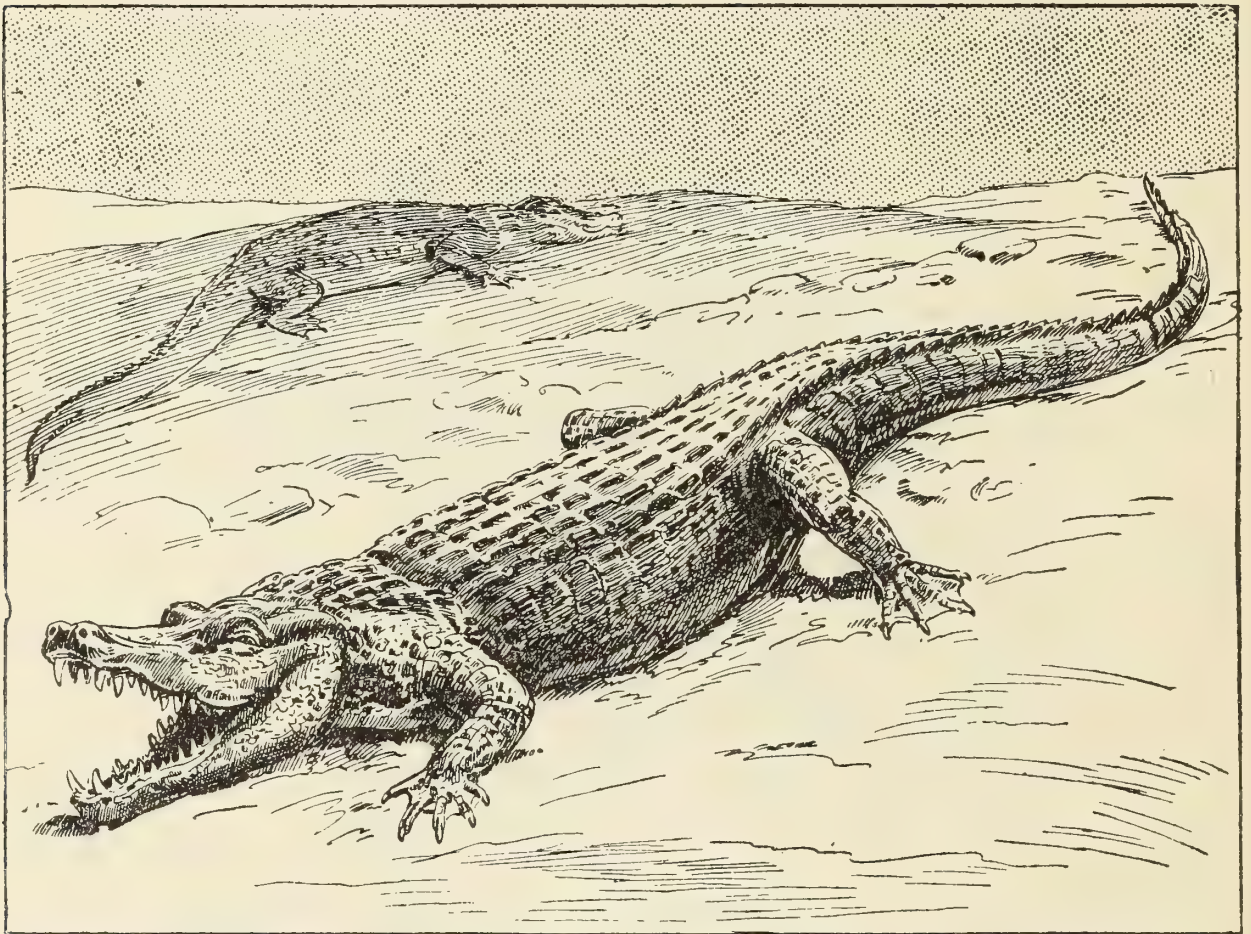
4. "They want something better than flies and insects to eat, I should think," said Nell.

"Of course they do; they eat fish," said Tom.

5. "Yes," added Will, "and they catch animals that go too near the river. A crocodile can dart through the water very fast, driving itself along by its strong tail, in much the same way as a

fish. But it cannot get about quickly on land; with its short legs, and such a long body, it cannot turn round easily."

6. "The crocodiles come out of the water sometimes, I suppose?" said Nell.



Crocodiles on the River bank.

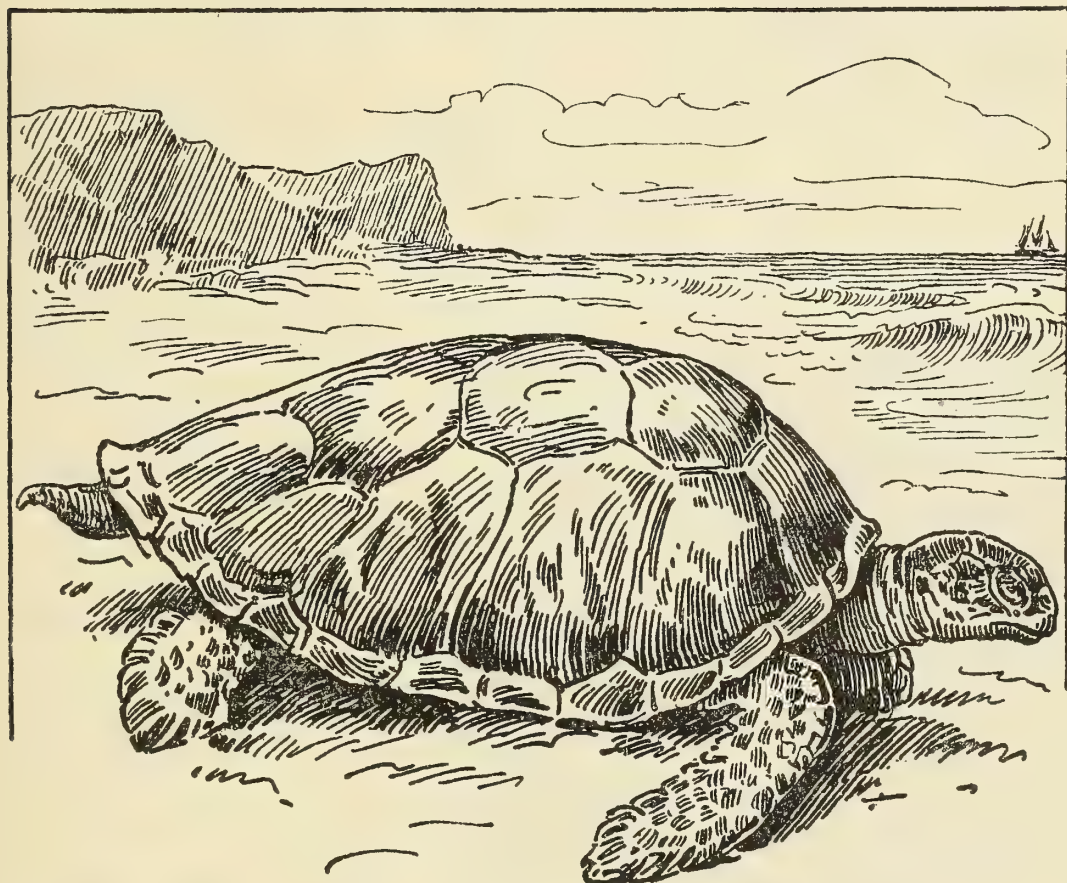
"Oh, yes! they like to bask in the sun. And they lay their eggs in marshy places on the river banks," said Will. "When the young ones are hatched they follow their mother through the water as ducklings follow the duck. Many of them get eaten by birds and other creatures, and the mongoose is very fond of the eggs."

7. "I am glad of that," said Tom; "for I am

sure we don't want many crocodiles about. I don't mind the pretty-coloured lizards, because those little reptiles are harmless."

"Why do you call them reptiles?" asked his sister.

8. "Because they *are* reptiles," replied Tom.



Green Turtle.

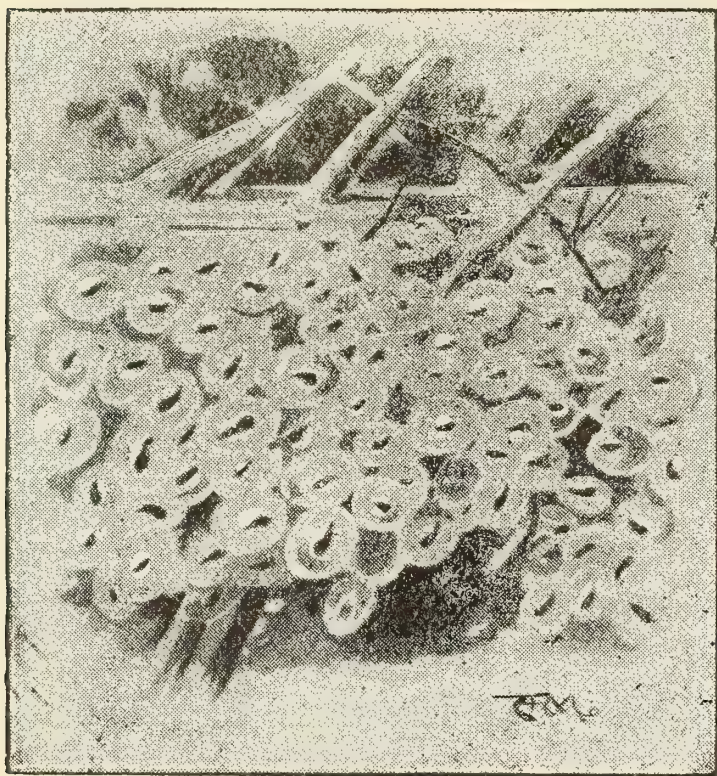
"But you should explain, as teacher did," said his brother. "You know he said that crocodiles, alligators, turtles, snakes, and lizards were so much alike in many ways that we may put them all in the same class, and give them the same name—reptile."

9. "He said that reptiles do not feed their

young ones on milk, and that they are covered with horny scales or plates. They have cold blood; and, as they breathe by lungs and not by gills, they are air-breathers."

TADPOLES AND FROGS.

1. "Look here, Harry," said Mr. Green to his little boy, as he pointed to something, almost like a lump of jelly, which he had just drawn from the pond. "What is this?"



Frog's Eggs.

Harry could not tell.

2. "It is a cluster of eggs," said his father. "In each of the round, clear eggs you may see a black speck; that is the yolk, and the sticky, jelly-like covering is something like the 'white' of a bird's egg."

3. "But those eggs have no shells," said Harry.

"That is true, but still they are really eggs, as you shall find out. I shall not tell you what

kind of creature laid them. You may take some of them home, and keep them in water until they hatch, and then you will find out for yourself what they are."

4. Harry kept the eggs for several days, until, at last, a little black creature, with rounded head and flat tail, wriggled out of each of them.

5. Even then Harry did not know what they were; they were the oddest little animals he had ever seen. They flapped their tails to and fro to drive them-



Tadpoles.

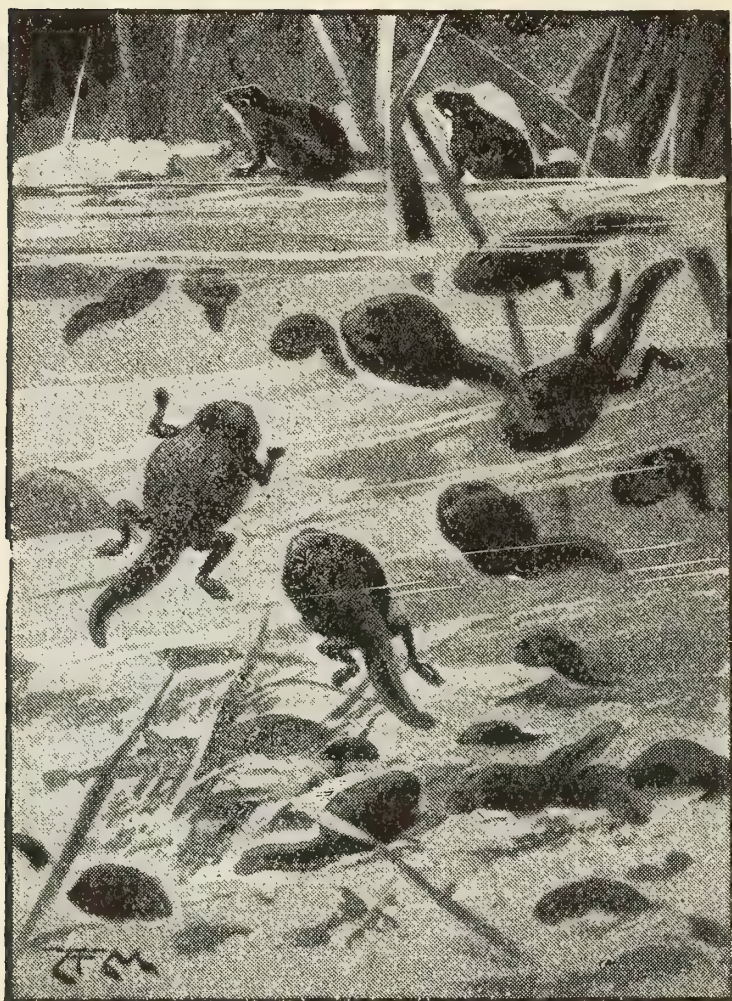
selves through the water, and when they rested they held on to the weeds by little suckers on their heads.

6. "They are tadpoles, Harry," said Mr. Green. "I want you to take notice of them every day, for I think they will amuse and surprise you."

Very soon Harry saw that the tadpoles had something growing out from each side of the neck.

7. "Those are their gills," said his father, in answer to Harry's questions. "By them the tadpoles breathe, for, like fishes, they have no lungs."

8. Day by day Harry watched the tadpoles,



Different Stages in the Growth of the Tadpole to the perfect Frog.

and, as they grew, they changed so much that he was quite puzzled. He thought he could see little legs growing on them, and their tails and gills seemed to be shrinking away.

9. "Father, do come here," he said one day. "I have often thought that the tadpoles were changing

into something else, and now I am sure of it."

Mr. Green smiled. "I have no doubt they are," he said. "They are turning into little frogs."

10. Harry's eyes opened wide in wonder. "Frogs, Father!" he cried; "then they were frogs' eggs which we brought home."

11. "They were; or frog-spawn, as we call them," said Mr. Green.

Harry watched the queer creatures more than ever now, until at last he had no tadpoles at all, but perfect little frogs instead, that had to raise their nostrils above water to breathe.

THE FROG.

1. "You must set the little frogs free now, Harry," said Mr. Green. "They have no longer any wish to eat the water-weeds on which tadpoles lived, but want insects, slugs, and other kinds of frog's food now. Besides, they can no longer breathe water, for they have lungs, as we have, and need to breathe in the air."

2. "But do not frogs go into the water sometimes?" asked Harry, who did not seem to care to lose the young frogs now.

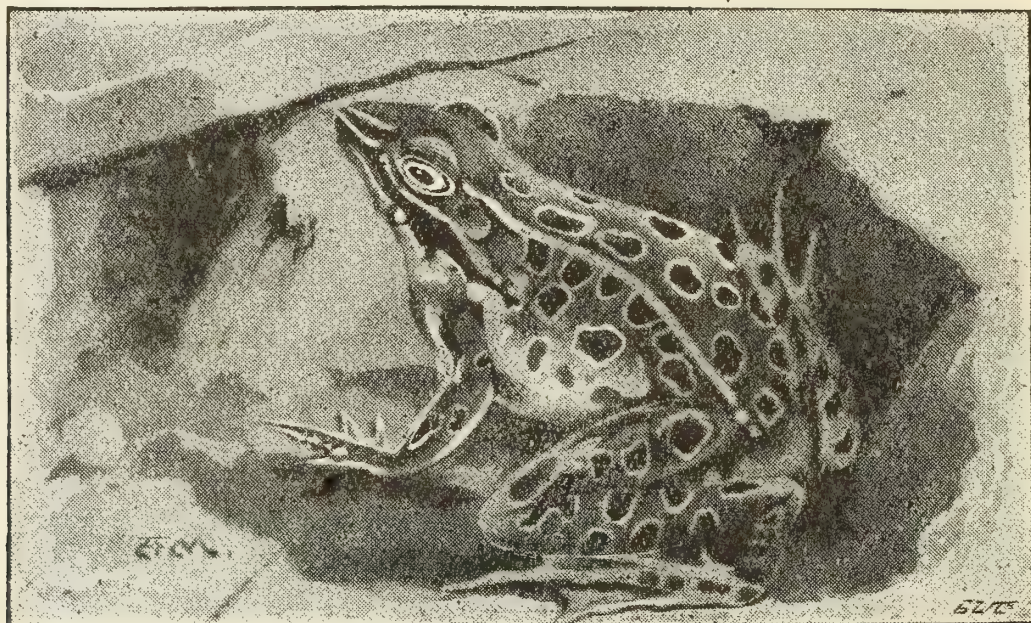
"They do," said his father; "and they can stay under water much longer than a man can."

3. "We may know that frogs are good swimmers by the look of their hind feet, which are webbed. There is a very thin skin between the long toes."

"On land the frog leaps by means of its long hind legs. It is fond of living in moist, swampy

places, and its skin is full of little pores, through which both water and air can pass.

4. "As the frog grows it changes its skin many times. When a new skin is ready the old one splits so that the frog can get it off. Then it rolls the old skin into a ball and swallows it."



The Frog.

"What a strange thing to do!" said Harry
"Has a frog any teeth, Father?"

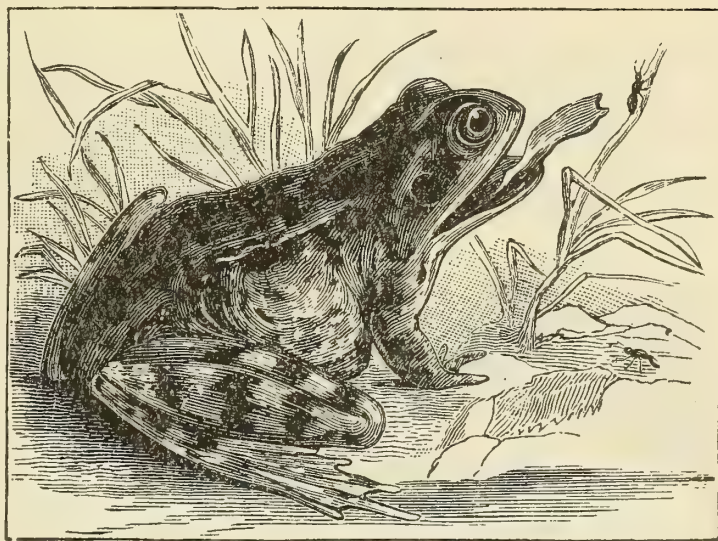
5. "Yes, but only in the upper part of its mouth. These are useful for holding the prey, but are not meant for chewing, as the frog swallows its prey whole. It catches the insects with its tongue, which is a very curious one.

6. "The tongue is not fixed at the back of the mouth, as ours is, but to the front of the lower jaw, so that the loose end points backward.

“When the frog sees a fly near, it opens its mouth wide, flaps its tongue out, and then in again, bringing the fly with it. This it does so quickly that your eye is scarcely sharp enough to notice it.”

7. “Lizards are reptiles, I know,” said Harry. “Are frogs reptiles too?”

“No,” replied his father. “The reptiles never have gills, and you know that a frog has them at one stage of its life.”



Tongue of Frog put out to take its Prey.

8. “Then my little frogs are just ready to begin their second stage of life,” said Harry. “Do you think they are quite ready to breathe the air?”

“Oh, yes!” said Mr. Green. “Just watch the movement of their throats.”

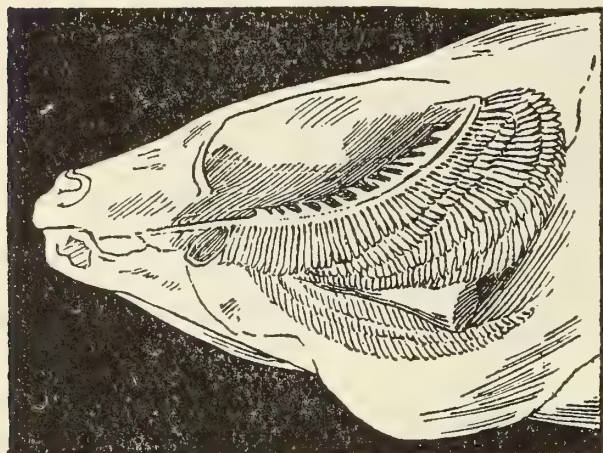
9. “They seem to keep on swallowing something,” said Harry.

“So they do. They close their mouths, draw in air through their small nostrils, and then swallow it; and that is the way they breathe.”

THE SHARK.

1. The sea is the home of very many kinds of fishes. Though these differ very much in size and in shape, they are alike in being able to breathe and live only in water.

2. Most likely you have often seen a fish. Did you see the scales on its skin? If the fish had fur or feathers it could not pass so easily through the water. And did you notice the gills at each



Gill of Fish.

side of its neck, and the fins which it used when swimming?

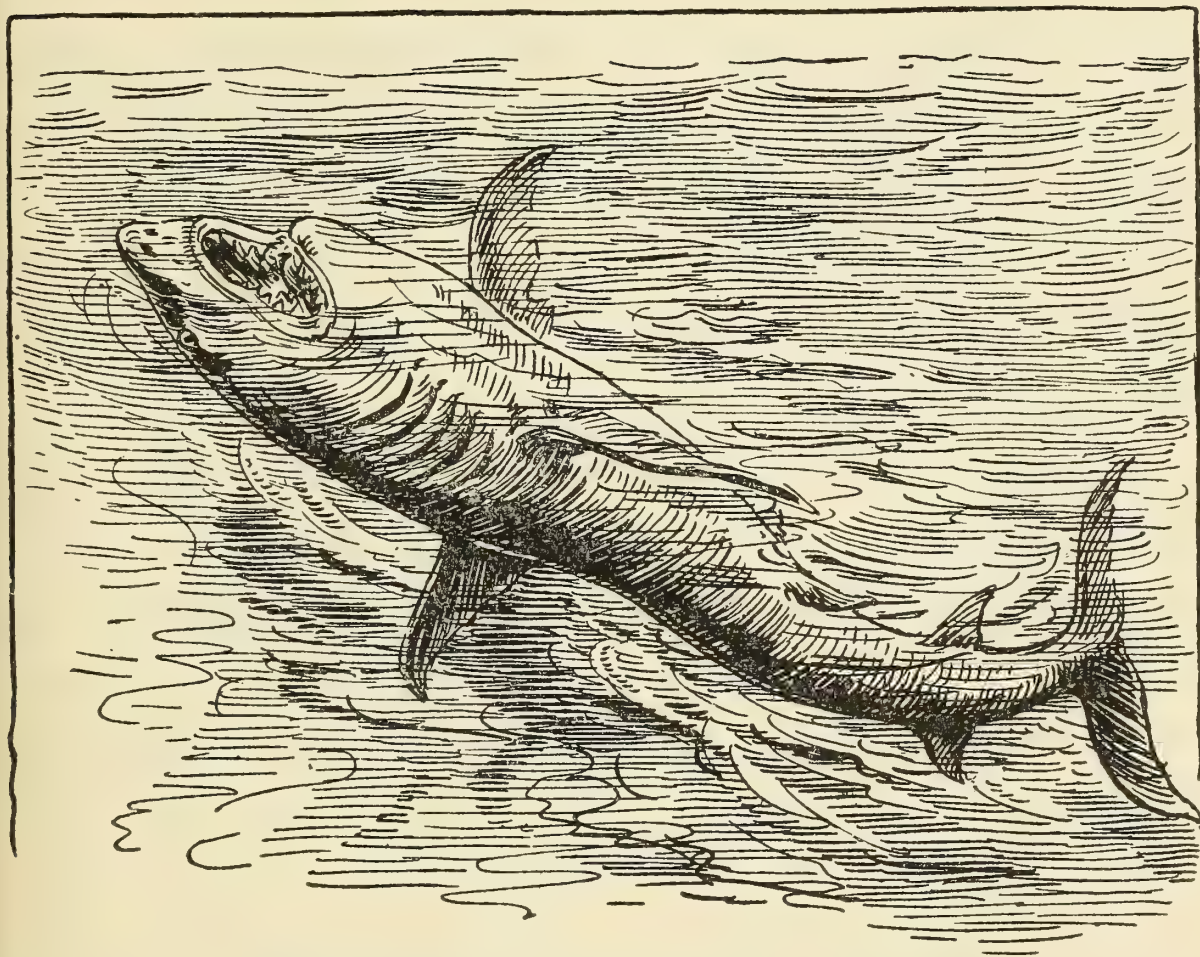
3. Fishes breathe by their gills. They take water in at the mouth, and force it out through the gill-slits, or holes, in the neck. On its way out it runs over the gills, where numbers of fine blood-vessels are spread out, so that the air in the water can get to them.

4. That is the way the fish's blood is kept pure and healthy, just as ours is kept pure by the air which we breathe into our lungs.

5. In most fishes the gills are in flat layers, and divided like the teeth of a comb. They are also hidden by a stiff covering, which acts like a lid,

and which opens a little to let the water out. But sharks, and some other fishes, have their gills fixed within little pouches, which open outwards through holes that have no coverings.

6. Fishes feed upon other fishes, and many of them are good food for us too. But the shark is



Shark—turned with mouth upwards to seize prey.

fierce enough to seize and eat us if we give it the chance. Men dread it because it is so large and strong, and because of its fearful-looking mouth, which is set with rows of sharp, white teeth.

7. The shark can raise its teeth upright, or let them lie at rest, just as it needs. It uses those

in the front row for seizing and cutting its food, and when they are lost or worn away, those in the hinder rows grow forward to take their places.

8. When the shark is about to seize anything that is above it in the water, it has to turn over on its back, because its mouth is so far under the lower part of its head.

9. Its body is just the right shape for passing swiftly through the water. It is rounded, and tapers off at its thick, fleshy tail, which ends with a very large fin. By swinging its strong tail, the shark drives itself along very fast, as it hunts after other fishes.

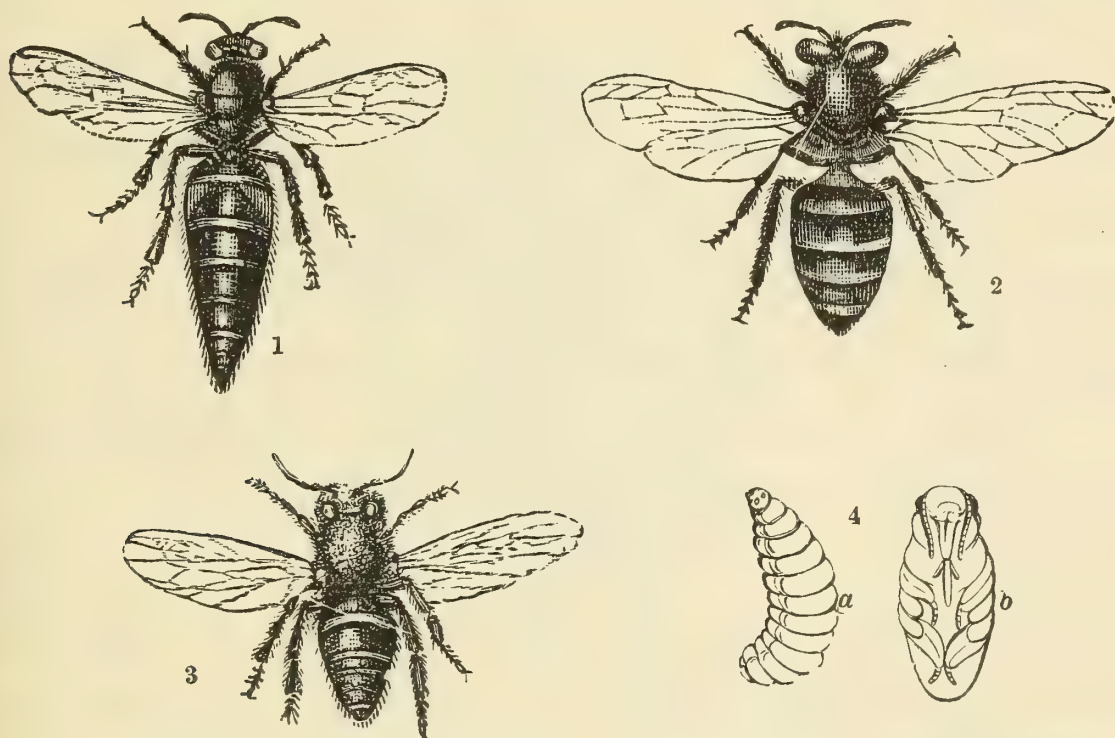
10. The shark's skin has very hard and horny scales upon it, and it is so rough that pieces of it may be used to polish wood. Sometimes purses and other fancy things are made of shark's skin, for it becomes hard and shiny, and, as you might expect, is very strong.

BEES.—I.

1. In the nest or hive of the honey-bee there are three kinds of bees. There is first the *queen*, or mother, which lays the eggs, and is larger than the rest. Then there are the *workers*, that build cells, gather honey, feed the young, and guard the

hive. The *drones* are the third kind. These have no stings, and, although they feed on honey, they do not bring any home. They live only for a few weeks, for the workers turn them out of the hive and kill them.

2. The queen does not gather honey; her time is taken up in laying eggs. She does not even



1, Queen Bee. 2, Male Bee or Drone. 3, Worker Bee. 4, a, Grub; b, Grub changing into a Bee.

seek her own food; but some of the workers bring her all that she needs.

3. All the bees show great respect for their queen, and seem to be proud of her. As she goes about the hive some of the workers always attend her, and keep an open space for her to walk in. They brush and lick her, offer her honey, and show her every kindness.

4. Some cells are for holding honey, and others for the eggs; but the queen lays only one egg in each cell. A few cells are made larger than the rest, and in them queen-bees are reared.

5. As soon as an egg is laid, the workers put beside it a little food, which they have made by mixing honey with the yellow dust gathered from flowers.

6. In a few days a little grub, or worm, hatches from the egg, and begins to eat the food which it finds ready. Then the workers bring it "bee-bread", made of the yellow flower-dust, and on this it feeds for the rest of its short life.

7. After about seven days the workers shut it in by fixing a waxen lid over its cell.

Does the grub die then? Oh, no! It begins to spin silken threads all over itself, and then becomes still and quiet; so that if you saw it you might think that it was indeed dead.

8. But all the time a great change is going on. After it has been in its silken cocoon for about ten days, its dry skin bursts, and a bee comes forth.

9. The insect soon breaks through its prison cell, and is at once fed by the others, until it grows strong enough to work and find food for itself.

BEES.—II.

1. When a hive becomes too crowded the queen leaves it, taking with her a swarm of bees, and seeks a new home. If a young queen-bee appears before she leaves, she kills it at once.

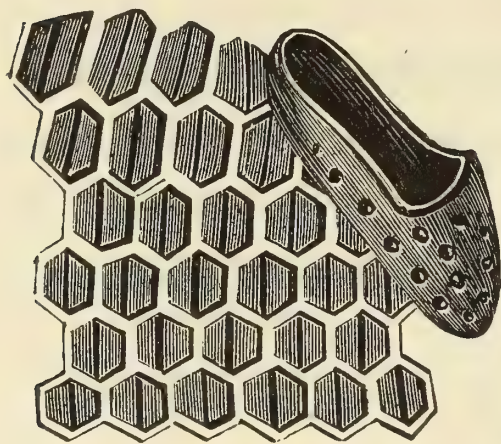


Wax-worker, seen from below (magnified).

2. Let me tell you how the bees make combs for their new home. You know that the cell-walls which form the comb are made with wax. But where does this wax come from? Under the bee's body there are six little flaps, like very small pockets, and in them the wax is formed.

3. When the bees want to make a comb, a number of them hang together in a long string for many hours, while the wax forms. Then, after moulding it with their jaws, they make the

cells, first fixing some wax to the place from which the comb is to hang.



Part of Honeycomb with
Queen's Cell.

4. The cells are all six-sided, except a few which are meant for the young queen-bees. Those cells are larger than the rest, and shaped something like a thimble, as you see in the picture. When the cells are

ready, some of the bees begin to store honey in them. But first they must visit the flowers, and make the honey.

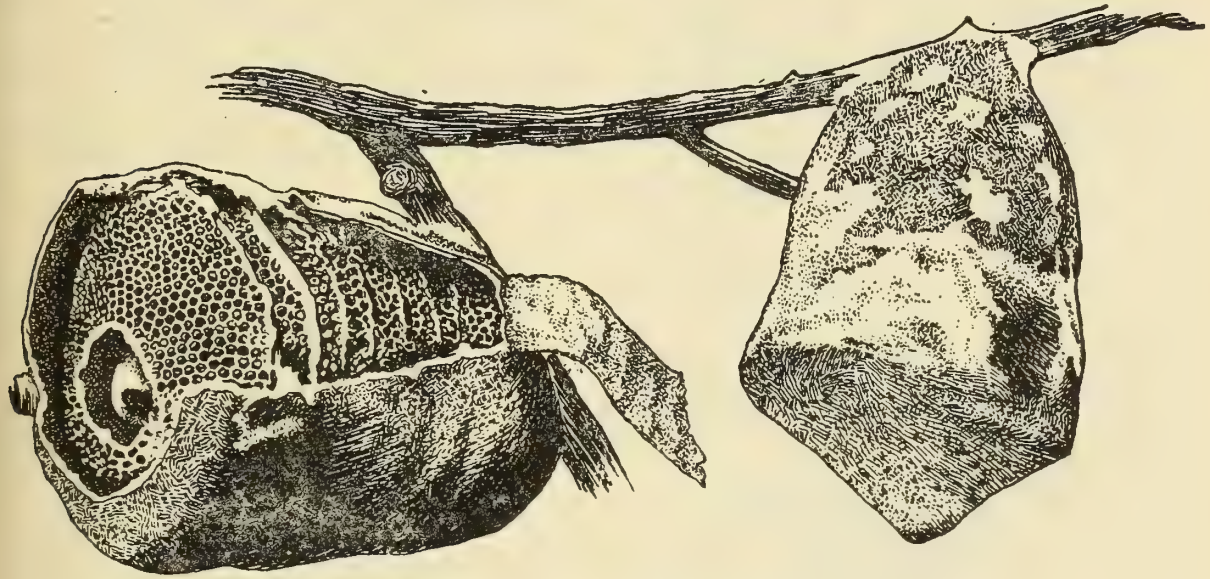


Head of Bee (shown
much larger than it
really is), showing the
brush-like Tongue.

5. The bee has a trunk, or long tongue, with hairs on it, forming a sort of brush. With this it sucks or wipes up the sweet juices of the flowers; these it swallows into its honey-bag, where they turn into the honey which the bee pours into the cells of the comb.

6. And how does the bee take home the yellow flower-dust which it makes into "bee-bread"? The worker-bee has very broad and hairy legs, so that the flower-dust clings to them, the long hairs holding it, as in a basket, while the bee flies home.

7. Wasps, like bees, help each other to build nests which have numbers of six-sided cells. The nests are mostly found in the ground, or hanging from a tree. They are made of mud, or of something very much like paper, which the wasps prepare by chewing fine threads of wood. The



Nest of Paper-making Wasp.

combs are placed flat, not upright, as in bees' nests.

8. All the cells in a wasp's nest are made for holding eggs, for the wasps do not store up food as bees do.

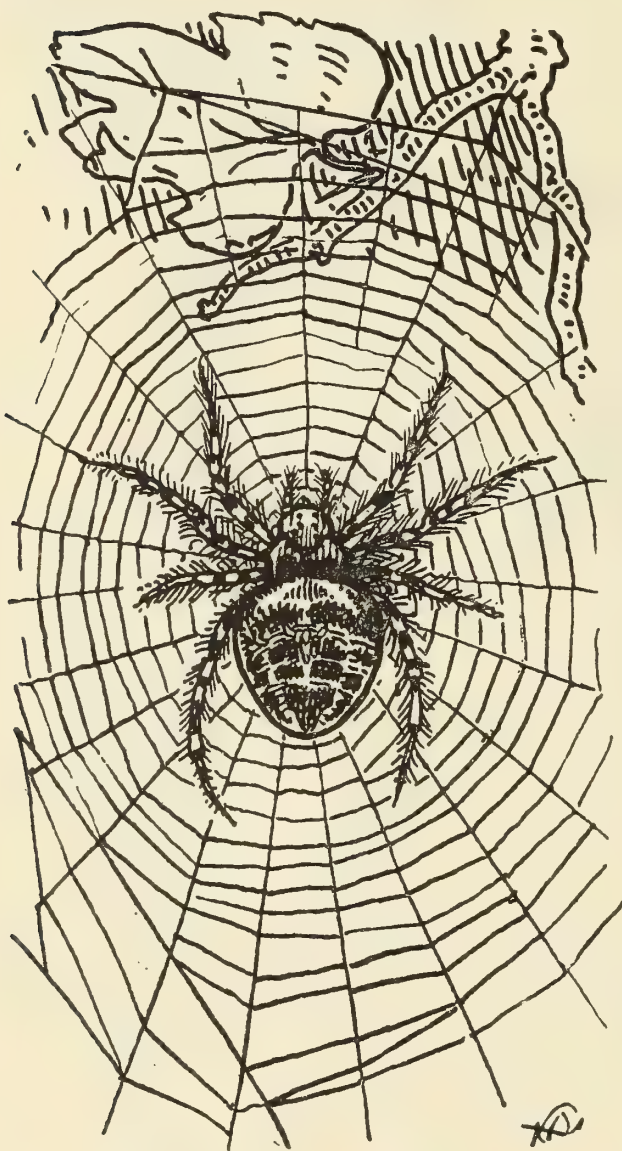
SPIDERS' WEBS.

1. "Look here, Sam," cried Lucy to her brother, as they came home from school one day. "Come quickly!"

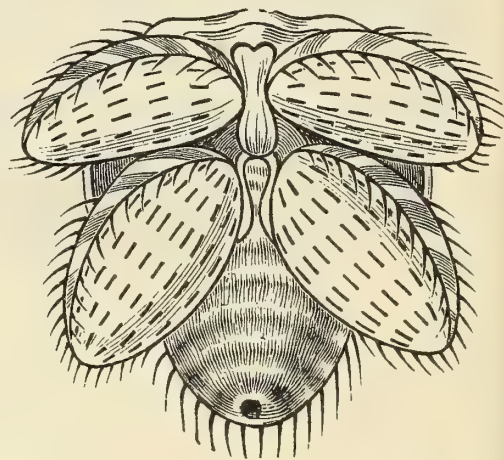
Sam ran to the spot just in time to see a spider

that had pounced on a fly in its web. Turning the fly quickly round and round, the spider spun a band of threads round the little prisoner's body, so that it could not escape.

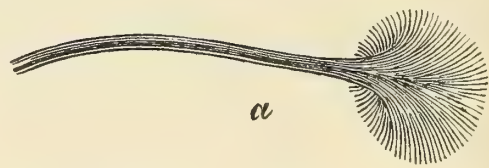
2. Just then, Mr. Hunt, the children's teacher, came by, and seeing what they were looking at, he said: "I will tell you how the spider spins its web.



Spider in Web.



Spinnerets.



Attached End of Spider's Thread.

"Near the end of its body the spider has from four to eight clusters of tiny holes, called its *spinnerets*, and from these it spins out the fine silk for its web.

3. "Within its body there are bags of sticky

fluid, like a kind of juice. This pours out from the holes, and hardens into silky threads as soon as it comes into the air. These threads are so fine that many of them are bound and twisted together to make a single line of cobweb."

"That is why the line is strong enough to hold the flies, I suppose," said Sam.

4. "Yes," replied his teacher. "Perhaps you know that all spiders do not make round webs for catching their prey, like the one you have just seen. Some spin long lines between leaves and branches, or amongst grass. The gossamer spider shoots out very long threads, by means of which it floats through the air. There are also spiders that spin webs only to make houses for themselves.

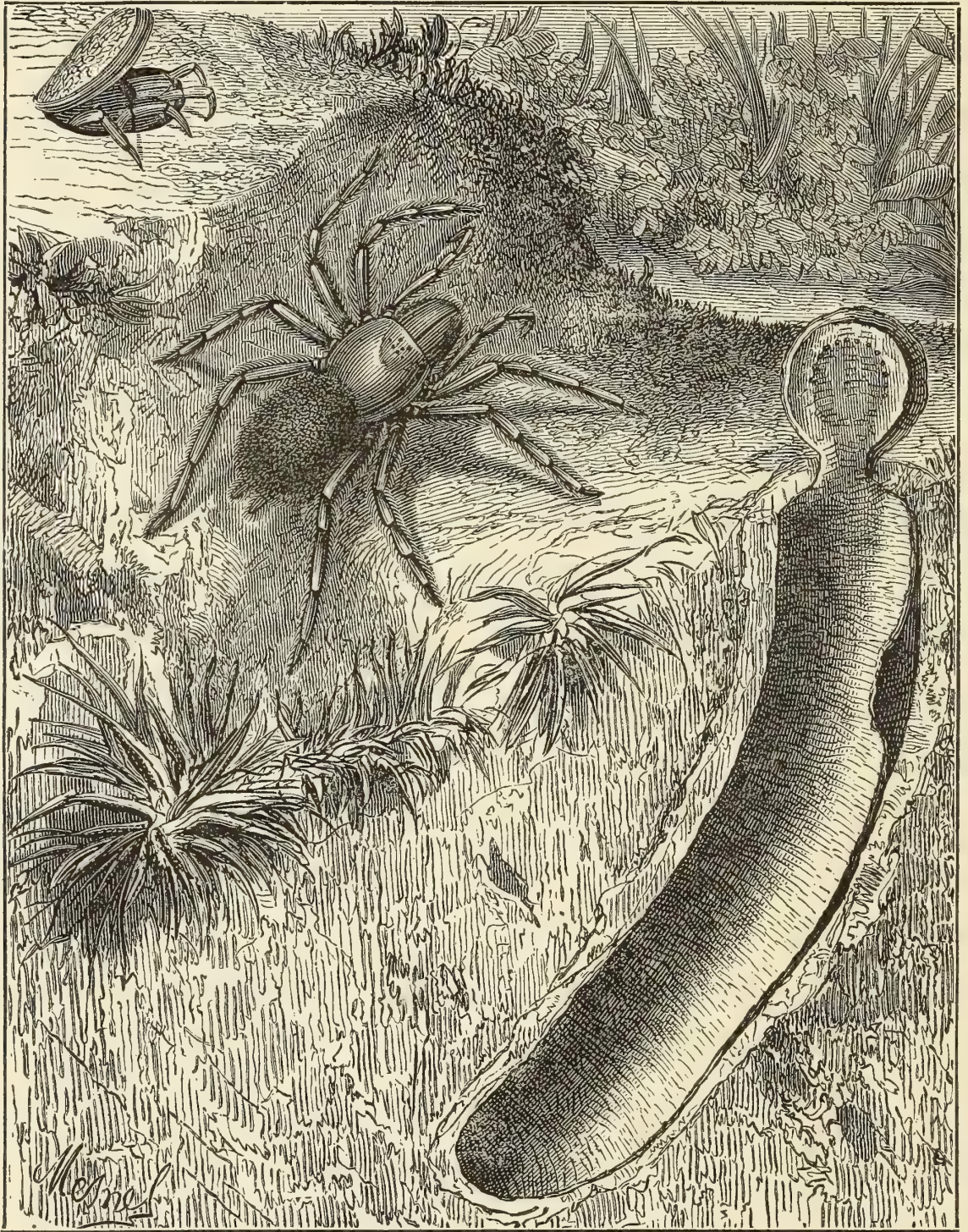
5. "Most spiders make a silken bag to hold their eggs, and some even carry the bag of eggs about with them."

"What sort of homes can spiders make with their silk?" asked Lucy.

6. "Have you never seen the trap-door spider?" said Mr. Hunt. "It scoops out a narrow hole, several inches deep, in the ground, and then lines it with threads. At the top of its hole it weaves a pad for a door, or lid, which fits closely, and moves as on a hinge.

7. "This clever spider takes care to mix mould

with the threads of the door, so that its home is not easily found. There it hides until it sets out



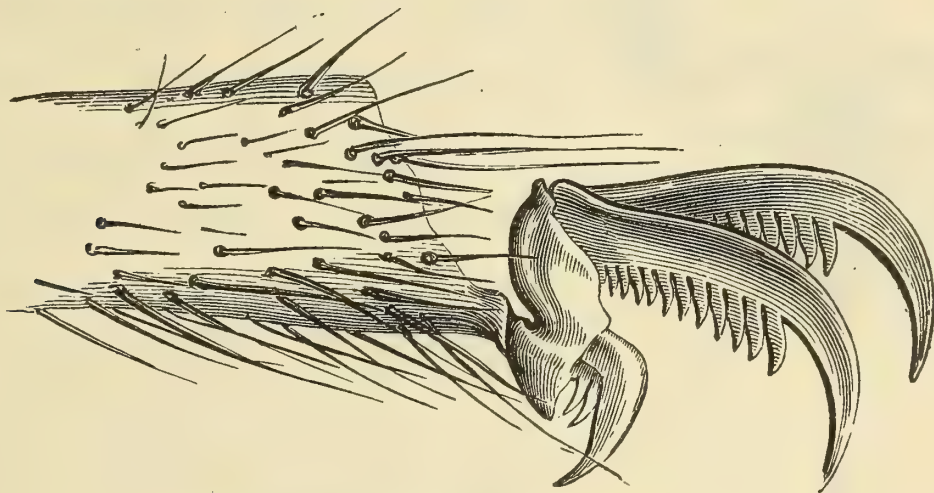
Trap-door Spider, and the Inside of its Home.

to hunt for prey. When the spider is at home, the door is not easily opened, for the little creature clings to it with all its strength."

THE SPIDER AND THE SCORPION.

1. The next day Mr. Hunt put a large spider in a wide glass bottle, and took it to school, that he might teach the children something about it.

“I think you all know that the bee is an insect,” he said. “Now the spider is not. I want you



Spider's Claw (drawn very large).

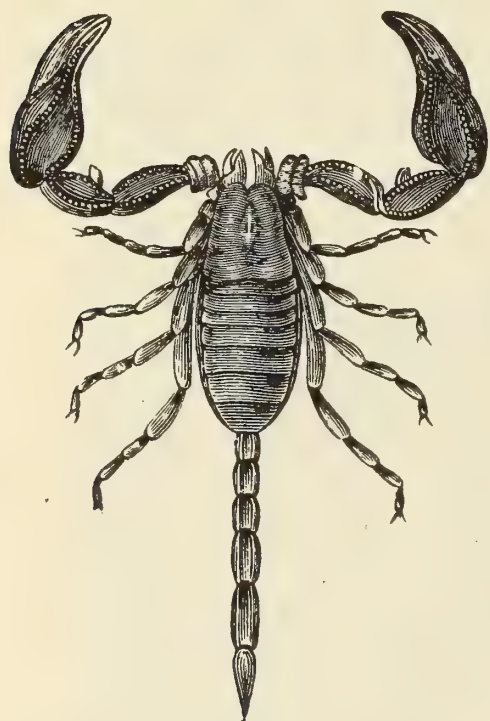
to learn why we do not class it with the insects. Count its legs.”

2. This was easy to do, as the legs were so long, and the children soon saw that there were eight.

“Now look at its body,” said Mr. Hunt. “You see that it is formed in two parts, the head and chest being joined to form one part. In an insect the body is in three parts, as the head and chest are not joined in one; and an insect has six legs, but never more than that number.”

3. “But it has wings,” said Lucy.

“Yes; and a spider never has wings,” added Mr. Hunt. “All spiders have not the same number of eyes; they have either two, four, six, or eight. Their legs end in little claws, which are useful in guiding the threads, and fixing the web in its right place.



Scorpion.

4. “When the spider’s eggs hatch, perfect little spiders come out, just like their parents, only, of course, smaller. Bees and other insects, as you know, are not born in this way.

5. “Now let me tell you how a spider kills its prey. It has sharp, pointed jaws, with which it can pierce a hole, and at the same time pour in poison. In this way it can kill a creature much larger than itself.”

6. “Can a spider sting?” asked one of the boys.

“No,” replied Mr. Hunt. “But it has a cousin that can. I mean the Scorpion, which belongs to the same class of animals as the spiders. Look at this one.

7. “You see that the scorpion has eight legs, and a pair of nipping claws. You see, too, that the head and chest are not parted from the rest

of the body by a narrow 'waist', as they are in the spider.

8. "But the hinder part of its body differs from that part of a spider, for it is formed in rings which are plainly seen, and it ends in a hooked point, or claw. It also has a strong and horny shell for a covering.

9. "The scorpion can run very fast, and mostly carries its tail curved over its back. When it catches an insect for food, it seizes the little creature with its pincers, and stings it to death with its tail."

CRABS AND LOBSTERS.

1. "Come into the house with me, Lucy and Sam," said Mr. Hunt one day. "I know you are very fond of animals, and I will show you some 'crusty' ones. Here they are!"

"One is a crab and the other a lobster," said Sam.

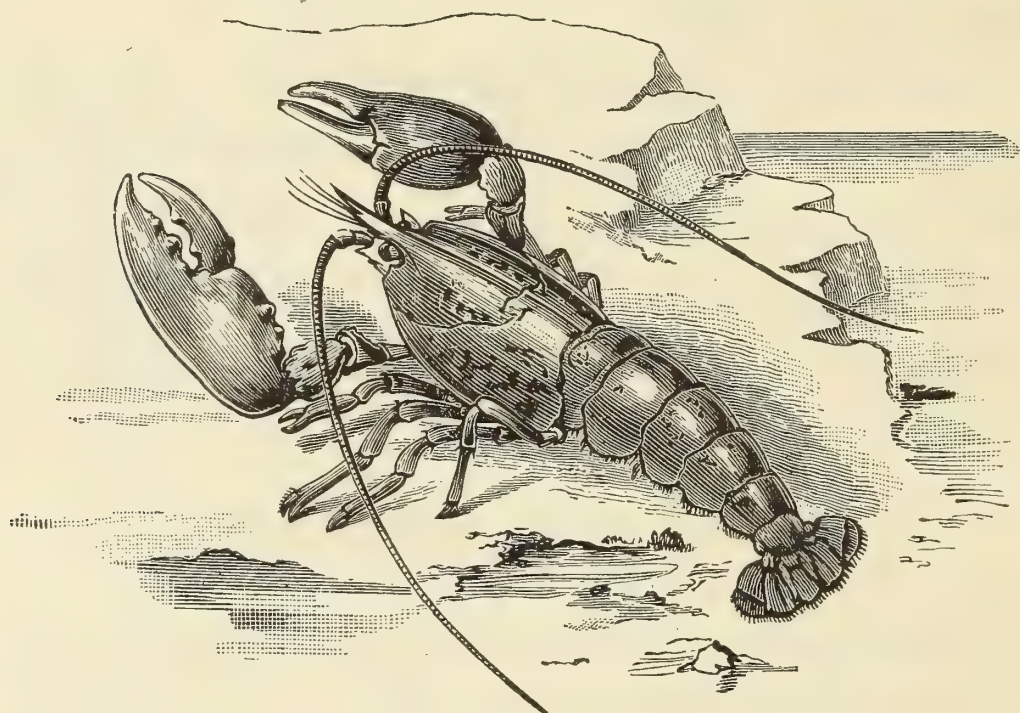
2. "Yes," added Lucy; "but why do you call them crusty?"

"That is a good name for them, I think, because of the hard shell which covers each like a crust," said Mr. Hunt. "It is just fitted for the stony places where they like to live."

3. "But the shell does not cover every part," said Sam. "At the joints of the legs I see a hard skin."

“I am glad you notice the joints, for the crabs and lobsters belong to the same great division of animals as spiders and insects, which also have jointed limbs.

4. “You see that there are ten legs, the front pair being larger than the rest. That pair, as



Lobster.

you see, is fitted with strong nipping claws, which are useful for tearing up food.”

“These crusty animals look very fierce,” said Lucy. “Are they really so?”

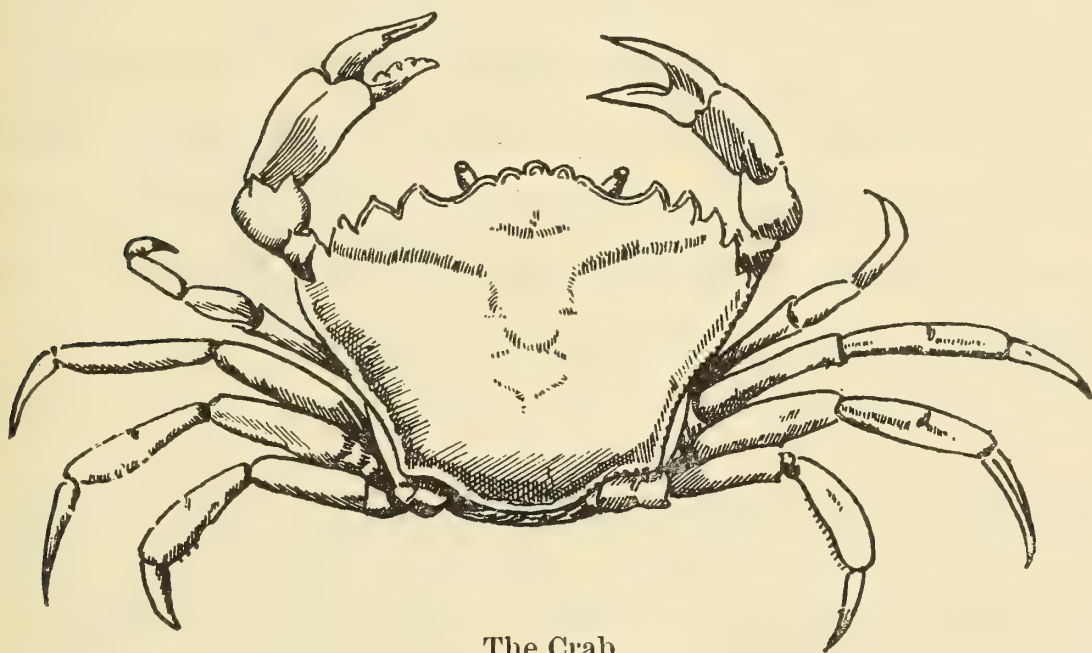
5. “They are indeed,” said Mr. Hunt. “They fight fiercely with each other, and the one that proves the stronger is almost sure to eat the other. If a limb gets broken off in the fight a fresh one will grow in its place.

6. “Do you see the eyes? They are set at the

end of little stalks. And look at the long feelers, which can be safely packed and carried so as not to be hurt by the stones."

"The crab and the lobster are not much alike in shape," said Sam. "The crab has not a tail, as the lobster has."

7. "What you call a tail is really part of the



The Crab.

lobster's body," said Mr. Hunt. "The head and chest are in one piece, as in the spider, and are covered with this hard, shelly plate. The rest of the body is in rings which are jointed together in such a way that they freely move, and thus allow the body to bend. Underneath are little limbs called 'swimmerets' for use in swimming; and at the end is a large fan-shaped fin.

8. "We must turn the crab over if we wish to see the other part of its body. There it is! You

see that it is very short; it is turned under, and tucked closely in. Crabs have limbs only for walking. They do not swim like the lobsters.

9. "At certain times a crab or lobster hides in some hole amongst the rocks, to cast off its shell; and there it stays until the new shell hardens, to protect its soft body.

10. "Of course you have heard of the land crabs. These live in boggy places, or else in cracks on the mountains. But once a year they march straight down to the shore, to let the water wash the eggs from their bodies. Then they go back at once to their homes on land."

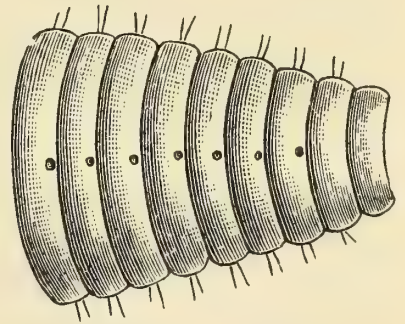
THE EARTHWORM.

1. "Don't tread on me," the worm would say if it could speak. "I am very harmless, and do good in the world. The planter can tell you that I am of great use in helping to make the soil fit for his crops.

2. "I live in the dark ground, and make little tunnels wherever I bore my way. In very dry weather I go deep down where the soil is moist, for dry earth does not suit me.

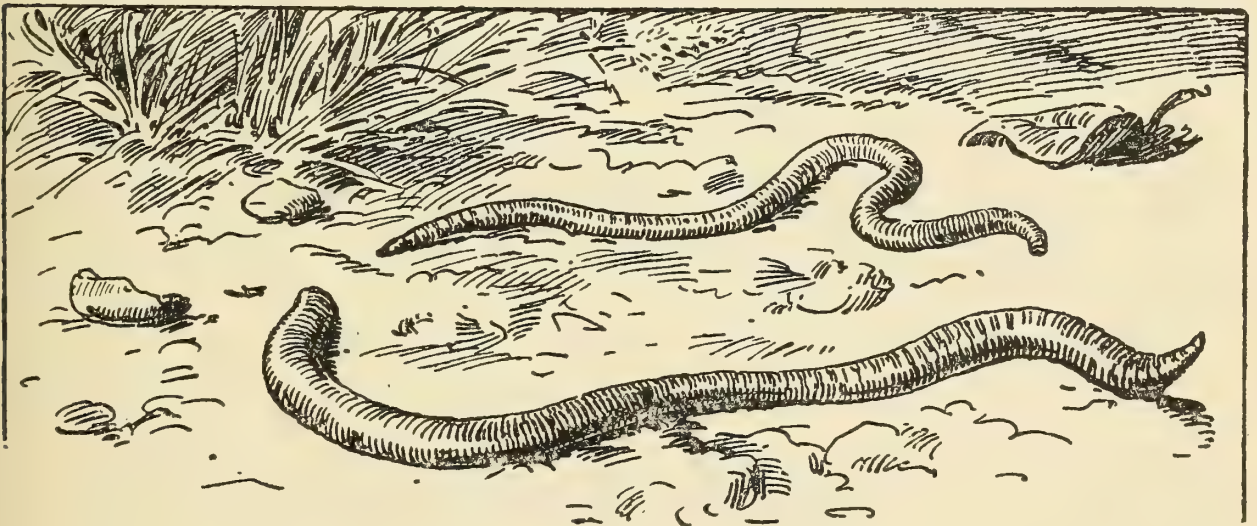
3. "Perhaps you wonder how a soft creature like me can bore through the firm ground. But you will know when you hear how I am formed.

4. “My body is very soft; it has neither bones within it, nor hard shell to cover it. It is made up of a great number of rings, which fit close to each other. Each of these rings has eight short stiff hairs on it, four being on the under part of the ring, and two at each side. It is by the help of these hairs that I travel, for I have no feet.



Part of Body of Earthworm (shown very large), showing Rings and Bristles.

5. “When I stretch my body forward I hold on to the ground by my hairs. When I enter the ground, my head forces its way between the small pieces of earth; then I draw the rest of



Earthworms.

my body forward. In this way, little by little, I get into the ground. The slime that is always on my body helps me to move along easily, and keeps the soil from clinging to me.

6. "Perhaps you cannot easily tell which is my head. But you will find that one end of my body is more pointed than the other. I call that end the head, because my mouth is there. It is a very small mouth, just on the under side of the second ring. But I have no teeth, and no eyes.

7. "I am fond of dragging straws and leaves into the ground. Some of these I eat, and some stay in the ground to rot and help to form good soil. I often swallow the rich earth, too, and then go up and cast it on the ground. Have you not seen the curly little heaps, or 'casts', which I and other worms have left?

8. "If you go out in the evening, when the ground is damp, you may find many of us stretched on the ground. You must step softly though, or we shall shrink away. We keep our tails fixed in our holes, that we may get in quickly if anything comes near us."

LITTLE WORKERS.

1. Though the earthworm is such a small creature, it does useful work in helping to make the soil fit for bearing crops.

2. If you wish to know how a worm can do that you must think of what it feeds upon. It

drags leaves and straws into the ground for food, or for stopping up the way into its tunnel. Some of these leaves rot in the ground and turn into leaf-mould, which is good for plants.

3. But the earthworm finds most of its food in the rich mould amongst which leaves and other things have rotted. After filling its body with this mould, it draws from it what is good for its own food, and then casts out the rest. In the worm's body the earth is well mixed, and is thus made even better for plants than it was at first.

4. It is good for a field to have fresh, fine soil brought out to the top, where the wind and rain can spread it about. Through the worm-holes, air and water can pass far into the soil. And both air and water are needful for the roots of plants.

5. Even when earth crumbles into the little tunnels some good is done; for then stiff clods are broken up and the soil is made loose, so that it is easy for roots to grow into it.

6. Ants also do much good to the soil. It is true that these insects often do harm by making their nests near plants or trees so as to disturb the roots; or they destroy plants by biting off the leaves, or by gnawing into the stems. But in other ways they do good.

7. To form their nests they dig out hollows and

tunnels in the ground, and in doing so they make the soil loose, and bring some of it out to the top. They carry in leaves, seeds, tiny pieces of wood, and other things which, in time, rot into fresh earth.



Ants.

8. In the woods fallen trees are hollowed out by millions of those silent little workers. Then such trees soon decay, and their remains become mixed with the soil from which other trees will grow.

9. You know that when men dig the ground they bury the top soil with the leaves or dead

plants that may be on it, and turn up the soil from beneath. With the hoe they loosen the ground to let in air and water.

10. Are not the changes which they thus make of the same kind as those which, in their own way, the ant and earthworm cause? These little workers really help the planter to till the soil well.

THE SNAIL.

1. There are many animals, without bones, whose bodies are formed on quite a different plan from those of the bee, spider, lobster, and earthworm. They are known as *soft-bodied* animals, and the snail is one of them.

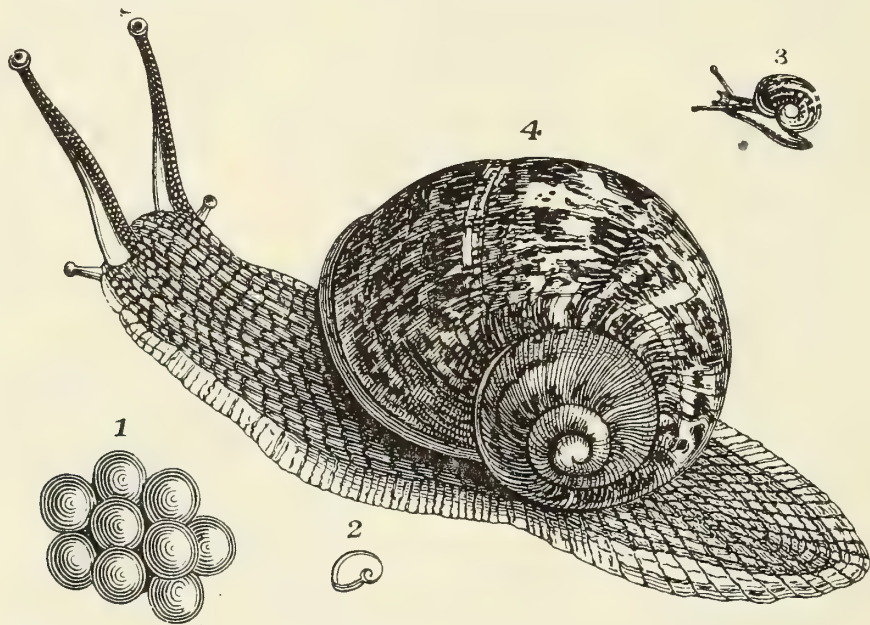
2. Snails feed on plants, and like to dwell in moist places. They cannot crawl if the ground is quite dry; so in very dry weather they get a moist footing by pouring out slime as they go. Of course you have often seen the shiny trail made by the slime where a snail has crawled.

3. Wherever it goes its shell, which is its house, must go too. The animal cannot leave it, though part of its body can come outside.

“To grass, or leaf, or fruit, or wall,
The snail sticks close, nor fears to fall,
As if he grew there, house and all,
Together.

“Give but his horns the slightest touch,
His self-collecting power is such,
He shrinks into his house, with much
Displeasure.”

4. After being hatched from the egg, the tiny young snail has, of course, a tiny shell; but, as the animal grows, it builds its shell larger and larger by adding a little more all round the edge.



The Garden-snail.

1, Eggs of snail. 2, Shell taken from egg. 3, Young snail. 4, Full-grown snail.

In this way it keeps the shell big enough for its body. You may see the little rows that have been added, one by one, if you look carefully at the lines round the shell.

5. No doubt you wonder how the snail can make them. I will tell you.

Under the shell there is a loose fold of soft skin, called the *mantle*, which, you know, is a name for a kind of cloak.

6. When the snail has to add to its shell it pushes the edge of its mantle just outside, and sends out moisture from it. In this there is some lime, which soon hardens into a new edging of shell.

7. That part of the body which is seen when a snail crawls is called the *foot*, because by it the snail gets over the ground. It first stretches out the front part of its "foot" and then draws the rest after it.

8. At its head you see four "horns" or feelers. They are soft, like the rest of the body, and two of them are longer than the others.

But where are the creature's eyes?

9. Look closely at the long feelers and you see a black speck at the tip of each. These specks are the eyes, and they can be pushed out or drawn in as their owner wishes.

10. Snails often do great harm to growing plants by feeding on the stems and leaves. On the other hand they are choice morsels for many birds, which are clever at picking them out of their shells.

In some parts of the world people eat snails, and think them very nice.

PART II.—PLANT LIFE.

PLANTS.

1. A plant lives and grows, and that it may do so it feeds and breathes, though not in the same way as animals do. It has not feeling as an animal has, nor can it move from place to place. It is fixed to one spot by its roots.

2. A plant feeds through its roots and leaves. Its leaves find food in the air, and its roots find other kinds of food in the soil. But we must not think that all the soil is plant food.

3. A plant cannot take in any solid pieces at all; its food from the ground must be taken in with the water that passes into its roots. So you might say that a plant can drink but cannot eat.

4. By their leaves plants breathe as well as feed; that is, they take in one kind of gas and give out another kind. An animal dies if it cannot breathe the air it needs, or if it cannot find proper food; so, too, does a plant.

5. You know that we rear many kinds of plants for the sake of their lovely flowers or their useful



fruits; but there are some plants, such as ferns and mosses, which never bear true flowers.

6. A flowering plant has roots, stem, leaves, flowers, and fruits. To bear fruit is the work that it lives to do, for the fruit holds the seeds, from which new plants of the same kind grow.

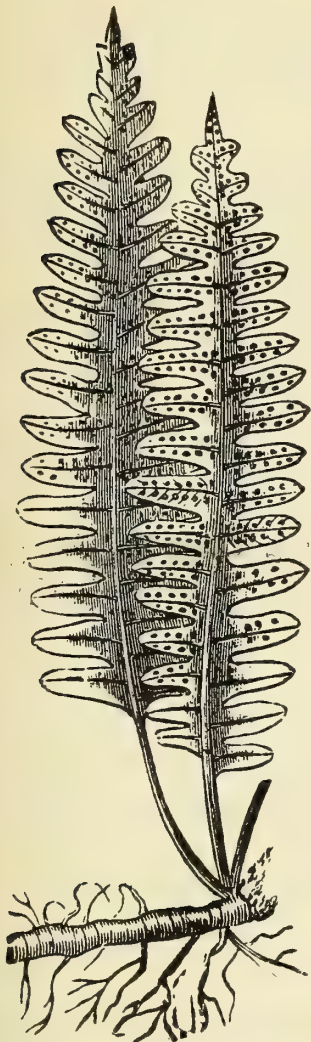
7. The roots usually go down into the soil, out of sight, while the stem rises above ground, or creeps along it. But some roots, as you may have often seen, grow in the air, either clinging to trees, like those of the five-finger, or hanging towards the earth, like those of the mangrove and some orchids.

8. A plant that never has flowers cannot have seeds, because seeds grow from flowers. How, then, can young plants of such a kind begin to grow?

9. To know this, you should look at the back of a fern-frond. There you may see a great many tiny brown specks crowded together. Those are clusters of little cases in which *spores*, looking like fine dust, are held; and from these spores young ferns will grow.

10. If there were no plants in the world, there would not be any animals, for there would not be food for them. You know that animals feed upon plants, or else upon other animals that have done so.

11. From the plants we get much of what we need for food and drink, clothing and shelter.



Fern showing two fronds with spore-cases on their surface.



A piece of a fern-leaf greatly magnified, to show clusters of spore-cases.



Single Spore-case.



Spore-case bursting and setting free its spores.



Maidenhair Fern. Spore-cases at the edges of the leaves.

Ferns and "Spores".

From them we also get wood for our ships, boats, and carts; fuel for our fires; pretty colours for our dyes; and drugs, which are good to take when we are ill.

ROOTS.—I.

1. One day Mr. Grey brought home a basket filled with a number of different roots for his children to see.

“I know this one,” said Frank. “It is a carrot.”

2. “And here is a beet-root,” said Jane. “It is nearly like a large carrot.”

“Yes,” said Mr. Grey. “And I may as well tell you about that kind of root first.

3. “Some plants, as they grow from seed, have a strong root, which grows straight down into the soil, having other roots branching from it. It is the chief or main root of the plant. You may see it in this young coffee plant. A root of that kind is called a *tap-root*.

4. “Sometimes it thickens out, as in the carrot; but not always. It sometimes ceases to be soft or fleshy, and becomes woody, as the tree or shrub to which it belongs grows larger, and needs to be firmly held in its place.

5. “Now let us find what the other roots in my basket are like,” added Mr. Grey. “Here is the root of a corn plant.”

6. “It is just like a bundle of long threads,” said Frank.

“It is,” said his father. “I could not help

breaking them as I got the plant up, for they go



Radish.



Carrot.



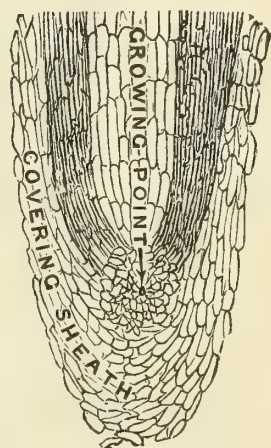
Coffee Plant.

Tap-roots.

down a great depth, and their little branches and hairs are fixed very tightly in the soil. The roots of the corn often grow much longer than the stem."

7. "I wonder that such tender things can push their way into the earth at all," said Jane.

"Each little thread, or rootlet, has a cap over its end," said her father, "and this cap protects the tender, growing point, as it works its way through the soil.



Tip of Root-fibre magnified.

8. "But we are forgetting our root of corn. You see that although the root-threads are



Fibrous Root of Maize.

branching, they do not spring from one main root. The root that first started from the seed soon ceased growing, and new root-threads sprang from the end of the green shoot.

9. "Pull up any kind of grass, and you will find such a root as this. We call it *fibrous*, because it is made up of a bundle of fibre-like roots.

10. "I want you to remember, then, that there are two kinds of roots; and when you see a plant dug up you can make up your mind whether it has a *tap-root* or a *fibrous root*."

ROOTS.—II.

1. “I wonder why the carrot has such a thick root,” said Frank.

“I will tell you a very good reason,” said his father. “In that root a store of food is saved for the plant to feed upon as it brings forth its flowers and seeds. But, as you know, we very often step in and take this food for ourselves. The beet-root and turnip also store up food in their thickened tap-roots.

2. “Here is part of a cassava root, in which the branches have become thick from the same cause. As the swollen parts look very much like tubers, we call this a *tuberous* root.”

“And what is this one?” asked Frank, as he picked up a small orchid which his father had cut from a tree.

3. “Ah! that shows you that some roots grow open to the air and light instead of in the soil,” replied Mr. Grey. “You may see them on the climbing stem of the five-finger, fixing it to a rock or tree. But can you not find some others in my basket?”

4. Jane drew from the basket a piece of corn stem, and Frank found a piece of pepper plant, each of which had roots starting from some of its joints.



5. "The screw-pine sends out large roots from its stem; I have seen them," said Frank.



The Screw-pine, with Roots growing from the Stem.

"Quite right," said his father; "and so do many of the palms. Now tell me what use the roots are to the plant."

6. "To hold the plant fast to the ground, or to

anything else on which it grows, I should think," said Frank.

"Yes, Frank, but that is not all. If you were to cut off all its roots, a plant would die, because it could not then take in food and water from the earth.

7. "The moisture can pass into the tender roots, and can carry with it the plant food that it has taken up from the soil. Some day I hope to tell you about the way the very tiny root-hairs suck in the moisture."

STEMS AND SHOOTS.—I.

1. The next day, when Frank and Jane were in the garden, their father called them to him.

"Look at this bean which I have just taken from the ground," he said. "It has begun to send out a young root and stem, and you may see the baby bean-plant."

2. "That is the root," said Frank, pointing to it as he spoke.

"Yes; and whichever way I place the bean in the ground, the root will turn downwards, into the soil, while the stem will rise towards the light and air.

3. "You must not, however, think that all

stems grow in that way. Presently I will show you that some plants have stems in the ground, hidden from sight.

“But first tell me of what use the stems above ground seem to be to the plant.”

4. “They hold up the leaves and flowers,” said Frank.

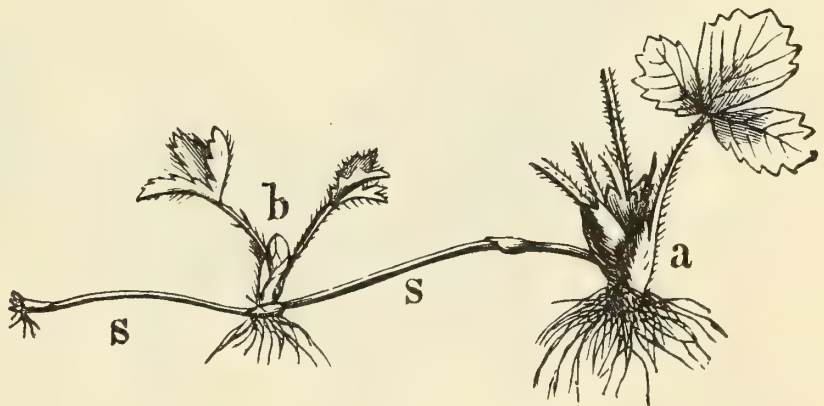
“Yes,” said his father, “and by them the plant food is carried from one part of the plant to another. Now I will tell you of one great difference between stems and roots. Stems have *buds* which give out leaves and branches, but roots never have buds.”

5. “A palm-tree has not any branches, except the one which holds its bunch of flowers,” said Jane, who had been listening all the time.

“That is because a stem or branch can only grow from a bud,” said her



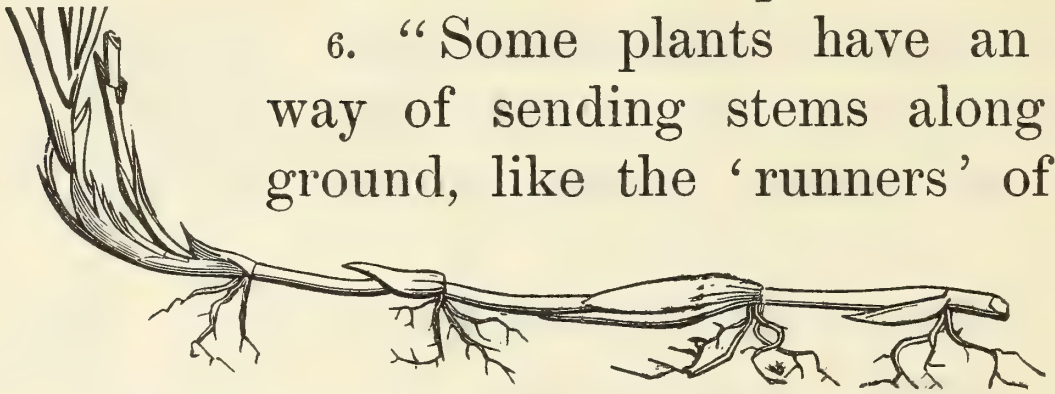
Germination of Bean Plant. 1, Below ground; 2, above ground.



Runner of Strawberry, showing (a) the parent plant, and (b) its offshoot produced at the end of the runner S.

father. “And on the palm there is only one bud
—the one at the top of the stem.

6. “Some plants have an odd
way of sending stems along the
ground, like the ‘runners’ of the



A Rhizome or Root-stock (stem that stretches underground).

strawberry plants. We know that these ‘runners’



Tubers of Yam Plant.

are really stems, for they take root, and send out
leaves.

7. "Again, many kinds of grasses and other plants have stems as well as roots, hidden in the ground.

"You know how the leaf-shoots of the banana and the bamboo sprout forth," Mr. Grey continued. "They spring from '*root-stocks*'. Now these cannot be true roots, for they have buds from which the shoots grow, and are therefore underground stems.

8. "The yams and cocoes are only underground shoots or stems, that have swollen out with the store of food sent down by the plant.

We call them *tubers*. The Irish potato is also a tuber."

"How strange!" said Frank. "I always thought that yams were roots."

9. "And so did I," added Jane.

"Are there any other kinds of stems?" asked Frank.

10. "Yes," said his father as he drew an onion from the ground; "this is one, and a lily has the



The Onion. (Bulbs.)

same kind. This stem is very short, and is covered with layers of thick leaves." As he spoke he peeled off some of these layers to show the children.

11. "Is that a tuber too?" asked Jane.

"No, we call it a *bulb*," said her father. "Its roots are the threads or fibres which hang from it."

"Well," said Frank, "who would have guessed that yams and onions were stems? I should not, I am sure."

STEMS AND SHOOTS.—II.

1. The children and their father walked on through the garden, and down the road, still talking.

2. "You cannot help seeing that even the shoots and stems above ground are not all alike," said Mr. Grey. "Some are strong and upright; but many are so weak that they either creep along the ground or cling to other things for support. Some weak stems twine round anything that may be near them."

3. "Do you mean like the yams?" asked Frank.

"Yes," replied his father. "Then there is another way by which weak stems are held up,

as you may see in the English pea plant, which has little thread-like ends to its leaves, called



The Yam Plant, showing Foliage and Stem.

tendrils. These curl round whatever is near the plant, and hold it up."

4. "I think the grape vine has tendrils too," said Frank.

“Yes,” said his father, “and so have gourds, passion-flowers, and many other plants.



Leaf of English Pea, showing
Tendrils.

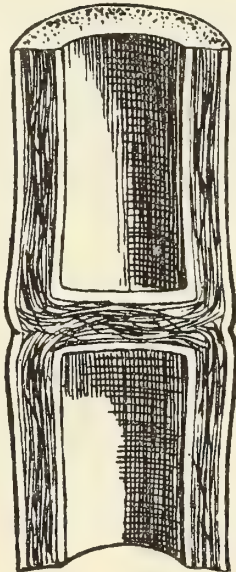
“Now let us think in what other ways stems are unlike each other.

5. “Many are round, but others are either square or three-cornered; some are smooth, others are covered with hairs, or even with prickles; some are jointed, others are not; some, like

the bamboo, are hollow, others, like the sugar-cane, are filled with pith or with wood.



Bamboo cut
across.



Bamboo cut
downwards.

6. “Even the hard, woody stems of trees differ very much. The stem of that palm is not at all like the stem of the orange-tree, the mango, or the logwood. It differs from them not only in form, but also in the manner in which fresh wood grows to increase its size.

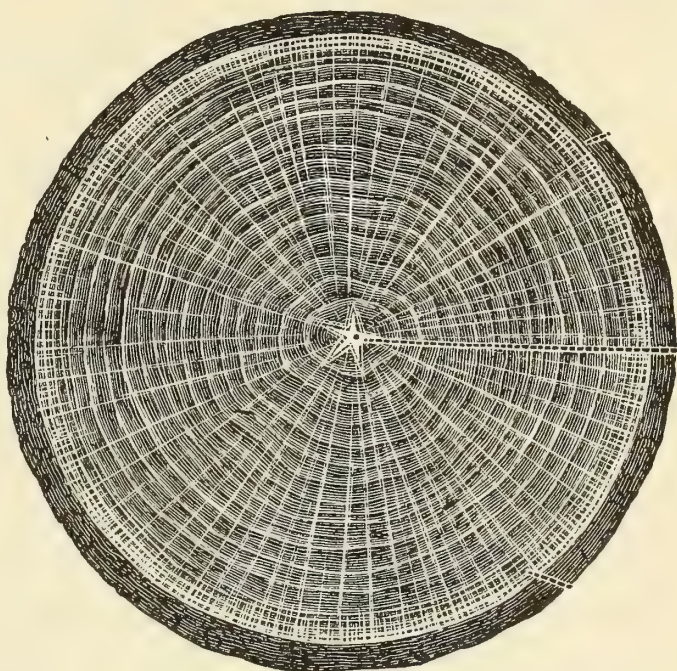
7. “A mango-tree gets bigger by rings of new wood growing outside the older wood—that is,

between it and the bark; while the pith is squeezed smaller and smaller in the centre. In such a tree we find the lower and older part of the trunk thicker than the higher and younger part.

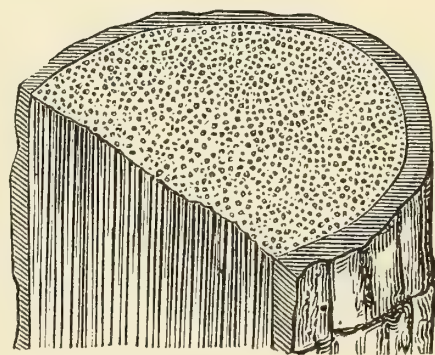
8. "But in the stem of the palm-tree, fresh wood grows in long thread-like bundles which do not join together to form rings. The pith

does not run like a cord through the centre of the stem, as in the mango, but is mixed up with the long threads of wood, that grow side by side though apart from each other. As they grow, they force the older wood-threads outwards, pressing them so close that the outer part of the wood becomes very hard.

9. "In trees that grow in size in the same way as the palm, then, the wood is hardest near the outside. But in the mango, logwood, and other trees that grow by adding



Trunk of Tree cut across, showing the Rings.



Piece of Palm Stem cut downwards and crosswise and showing the cut ends of the woody fibres.

rings of new wood beneath their cork-like bark, the hardest wood is near the centre. We call it the *heart-wood*."

LEAVES.—I.

1. It was about a week after Mr. Grey had talked with Frank and Jane about stems that he went into a room where the children were waiting for him. The table was almost covered with leaves of many kinds, which they had been gathering, and Mr. Grey added some others which he brought in.

2. "Come on, Father," said Frank. "We are waiting for you to tell us about the leaves which you asked us to pick."

"There are ever so many shapes and sizes amongst them," said Jane.

3. "And some of the leaves have no stalks," added Frank.

"Then you have found out," said his father, "that a leaf is made up of a blade only, or of a blade and its stalk."

4. "Yes," said Frank, "this corn leaf had no stalk; we scarcely knew how to get it, for it was wrapped quite round the stem."

"Many leaves grow in that way," said his father. "You may see them on the ginger plant,

on the sugar-cane and bamboo, and indeed on all grasses. They are called *sheathing* leaves, because they form a sheath around the stem."

5. "We were puzzled with some of the leaves,"



Corn, showing Stem with "Sheathing Leaves".

said Frank. "We hardly knew what to pick from the pea and the logwood."

"And do not forget the tamarind leaf," cried Jane.

6. "Why did they puzzle you?" asked Mr. Grey.

"Because there are so many blades on one

stalk," said Frank. "Look at this;" and he held up a tamarind leaf.

7. "That is only one leaf," said Mr. Grey, "although it is in so many parts. We call it a



Types of Leaves.

1, Simple (Orange); 2, Compound (Acacia); 3, Compound digitate (Ceiba);
4, Simple Lobed (Castor-oil Plant); 5, Spinous (Aloe).

compound leaf because it is not in a single piece; the little blades are *leaflets*, not leaves. The log-wood, pea, and some acacias also have compound leaves.

8. "On some plants the leaflets are spread out like the fingers of a hand, instead of being in two

rows along the stalk. Here is a leaf of that kind," he added, as he showed them one he had picked from a cotton-tree.

9. "We might sort all our leaves into two lots. In one we should have the *simple* leaves, or those in one piece, like the orange, mango, and castor-oil leaves; and in the other the *compound* leaves."

10. "The castor-oil leaf hardly looks like a simple one," said Frank, as he took it in his hand.

"But it is simple," said his father. "It has no leaflets, though it is divided into parts called *lobes*, just as the leaves of the vine, papaw, and cucumber are."

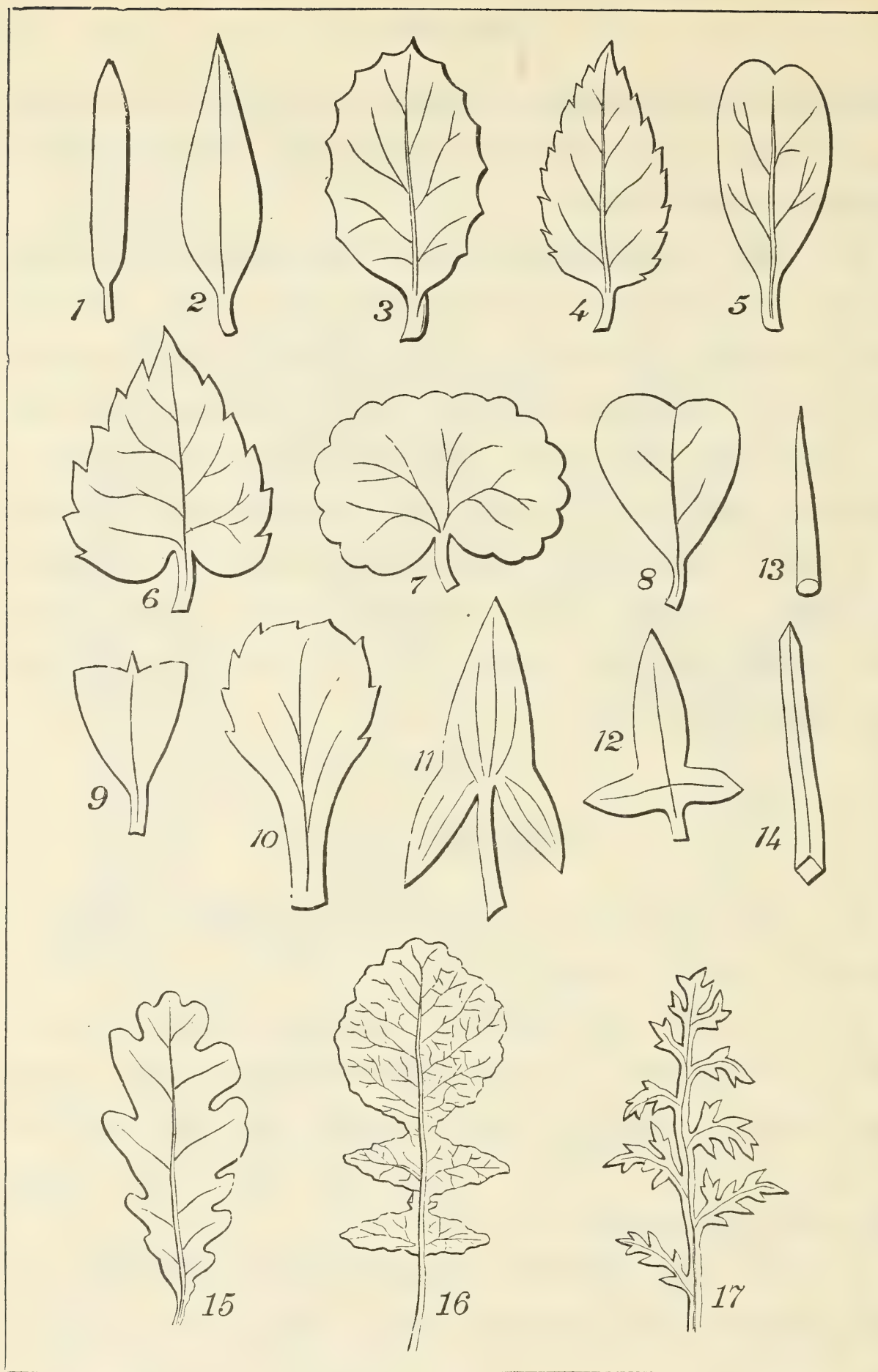
LEAVES.—II.

1. "We might sort leaves by their shapes, I think," said Frank.

"Yes," said his father, "though that is not so easy. We should find some nearly round, some egg-shaped, others like a heart, an arrow-head, a spear, and so on. But look at their edges. Are they all alike?"

2. "Oh, no, Father!" said Jane. "Some are quite even, and others have little teeth, like a saw."

"Yes," added Mr. Grey, "and some are as uneven as if pieces had been bitten out of them."



Simple Leaves illustrating variety in Shapes and Edges.

1, Line-like ; 2, Lance-shaped ; 3, Elliptic ; 4, Egg-shaped ; 5, Egg-shape reversed ; 6, Heart-shaped ; 7, Kidney-shaped ; 8, Heart-shape reversed ; 9, Wedge-shaped ; 10, With "winged" stalk ; 11, Arrow-shaped ; 12, Halbert-shaped ; 13, Awl-shaped ; 14, Needle-shaped ; 15, 16, 17, Leaves with deeply divided edges.

3. "I wonder what makes this tobacco leaf so rough," said Jane, as she passed her fingers over the surface of the large leaf.

"It is covered with stiff hairs," said her father. "How different it is from this smooth, shiny orange leaf. Many leaves have hairs: some, like those of the aloe, pine-apple, and pinguin, have sharp spines at their edges, and are very stiff and thick."

4. "That is why the pinguins make such a good hedge when they are planted in a row," said Frank.

"You have not told us anything about these lines in the leaves," said Jane, as she pointed to the ribs in a young banana leaf.

5. "We will not leave them out, Jane," said her father, "for they are very important. They are called the *veins* or the *ribs* of the leaf. They make a strong framework by which the blade is spread out, just as the ribs of an umbrella support the silk or cotton. Besides, they carry to the green cells of the leaf the plant-food that has been drawn up from the soil."

6. "See what a thick rib the middle one is," said Frank.

"Yes; that is called the *mid-rib*. It gives strength to the leaf. In some leaves, as in that cocoa or chocolate leaf, the veins spread about

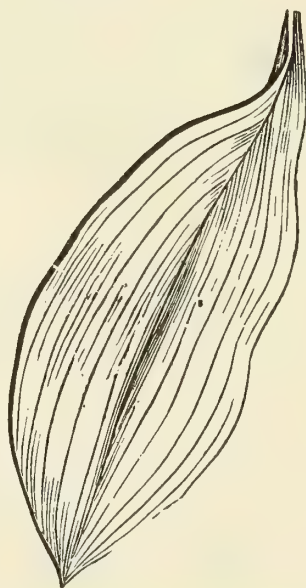
like a net-work. But in each half of the banana or the lily leaf you see that they all turn the same way, and lie side by side."

7. "So they do in this bamboo leaf," said Frank.

"Yes; the bamboo, the corn, and all other



Lime Leaf, showing
Midrib.



Parallel-veined Leaf
of Lily.



Net-veined Leaf.



Straight-ribbed Leaf of Bamboo.

plants of the grass family have straight-ribbed leaves."

8. "If we sorted the leaves out by their veins, how many lots should we get?" asked Jane.

"You would get two lots, or classes," her father replied. "In one the veins would branch in many directions, and the leaf would be *net-veined*; and in the other the veins would spread

out *side by side*. And you would find, in almost all cases, that those plants having straight-veined leaves have also fibrous roots.

9. "Some day you will learn how the plant both breathes and feeds by its leaves."

FLOWERS.—I.

1. "I like flowers better than leaves," said Jane. "The leaves are nearly all green, but the flowers show ever so many colours, and very pretty shapes too."

"Yes, but flowers soon die away," said Frank. "They don't last as long as the leaves."

2. "I know that," replied Jane. "But you forget that when a flower goes off it mostly leaves a fruit behind it."

3. "I think Jane is right," said Mr. Grey, who had overheard the children's words. "Flowers are very lovely, with their bright colours, and their sweet scents. 'Everywhere about us they are glowing', and I think the world would seem dull without them. They well deserve to be called the 'stars of the earth', for they brighten it as stars brighten the dark sky."

4. "Let us gather a few flowers and look at their parts. The more we find out about them

the more we shall admire the wonderful plan on which they grow, and the more beautiful they will seem to us.

5. “Now in this orange flower I dare say you think the pretty, waxy-white leaves are the best



Orange Blossom.

part. But, to the plant, that part, lovely as it is, is not the most important. It lives to protect the middle of the flower, which is the chief part, for from it the fruit will grow.

6. “Most flowers have two sets of covering leaves, which I will now show you.

“Just at the top of the little stalk which carries the orange flower you may see five green points. They belong to a little green cup in which the white parts of the flower seem to rest, and



The Lily.

they show you that five flower-leaves have grown together to form the cup.

7. “These little leaves are called *sepals*, and the cup which they form is the *calyx*. That name is given because it means ‘a cup’.

“If you look at some other flowers, you will find that the leaves of the calyx do not always

join; very often they are quite free from each other. Nor are they always green. In the lilies and many other flowers you will see them coloured almost the same as the next ring of flower-leaves.

8. "The number of sepals is not always five; they may be in threes or in fours; but, of course, each kind of plant always keeps to its own number."

FLOWERS.—II.

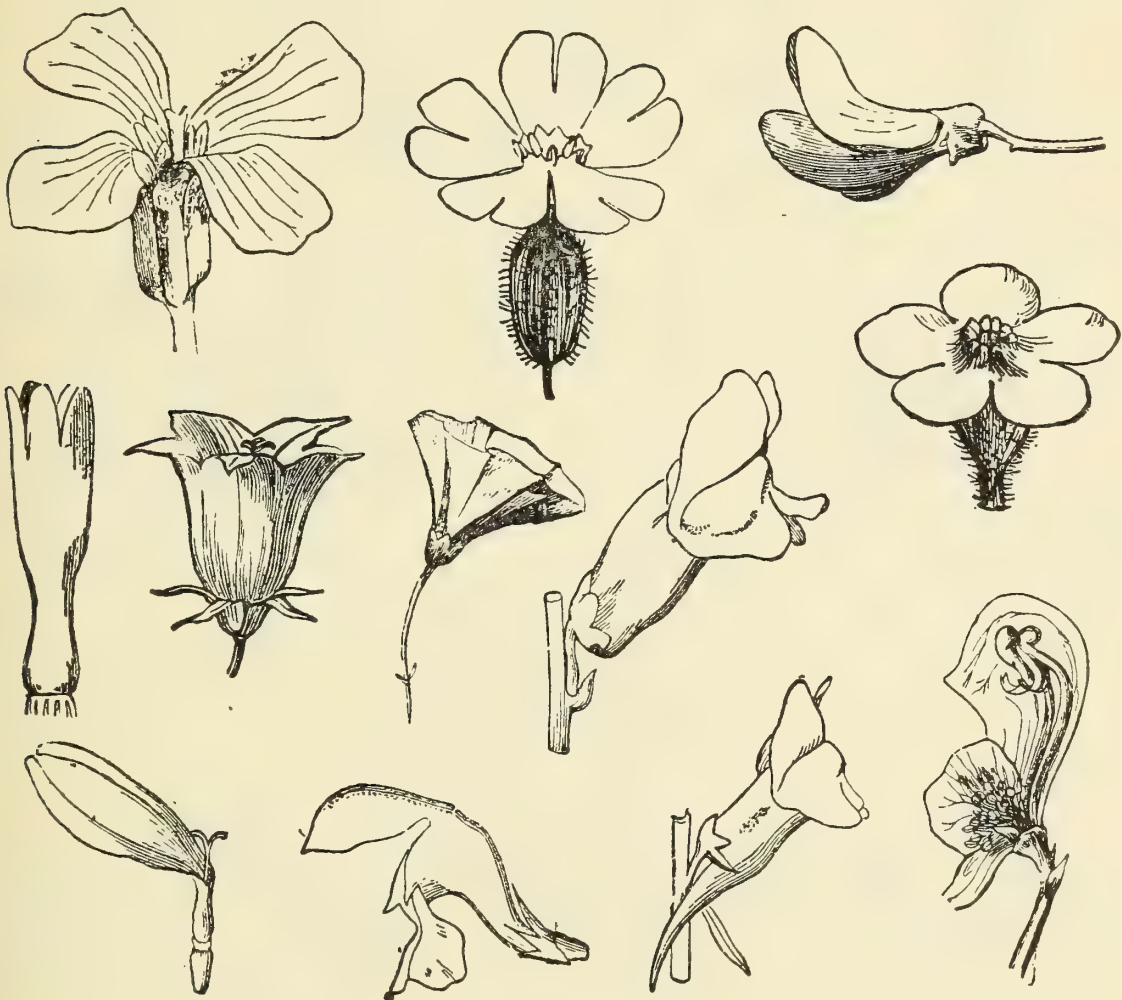
1. "Now look at the second ring of flower-leaves," continued Mr. Grey. "In the orange flower they are white. They grow just within the ring of sepals, and are the same in number.

2. "See how they spread out, as if doing their best to be seen. That is why we call them *petals*, for that word means 'spread out'; and the ring they form is called a *corolla*, because that is the word for 'a crown'. I think it is a good name for these lovely flower-leaves, for it reminds us of a king's rich and beautiful crown.

3. "Now see where each petal of a flower grows. It is not placed in front of one of the sepals, or outer covering leaves, but just in front of the space between two of them. In that way the inner parts of the flower are well taken care of, for the sepals cover the openings between the

petals, so that it is very hard for insects to get inside the flower-bud."

4. "Are these petals, Father?" asked Frank, as he pointed to the bright flower-leaves of an orchid he had picked.



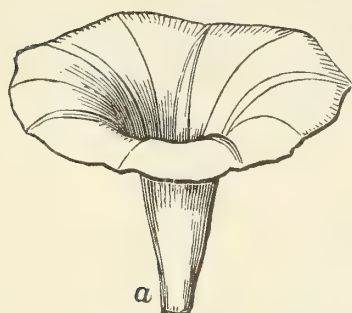
Forms of Corolla.

"Half of them are," replied Mr. Grey. "That is one of the flowers which does not have its outer ring of covering leaves green."

5. "You may see by the flowers in your hand that both sepals and petals differ very much in shape."

"You cannot always pick them off one by one,

as you can from the orange flower. In some the petals are joined, and growing in the shape of a bell, or a trumpet, or in many other forms."



a Corolla, *b* Calyx of
a Flower.

6. "The petals drop off after the flower has been open for a time," said Frank.

"Yes; as soon as their work is done and they are no longer needed they wither, and their short life is over. But the cup of green sepals often remains; you may see it on the orange even when the fruit is full grown."

FLOWERS.—III.

1. "Will you tell us the name of these tiny threads in the middle of the flower?" asked Jane.

"Each of them seems to have a knob at its end," said Frank.

2. "So it has," said his father. "And you have already given them a good name, Jane, for their real name is *stamens*, which means 'threads'. They each bear a little case of yellow dust, called *pollen*. When the cases are ripe they burst and let the pollen out. You may see it quite well if you shake a flower over a piece of paper.

3. When the bees and other insects pass into a flower, to suck its sweet juice, the pollen dust clings to their heads and legs, so that they carry it from one flower to another.



Flower being visited by a Carpenter Bee, which is receiving the Pollen on the under surface of its body.

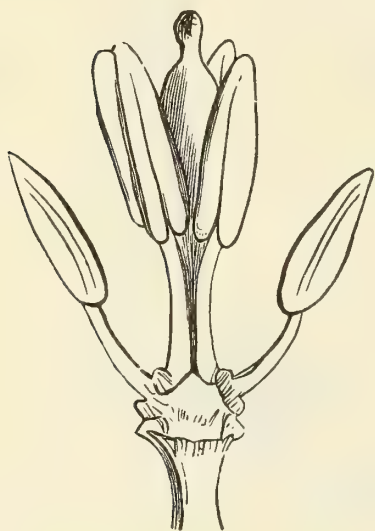
4. “You will learn one day that this is a good thing for the flowers, because it causes their seeds to grow. The bees are glad to have some of the pollen, and they carry it away to their homes to make ‘bread’ for the young bees.

5. “Now pick off all the stamens from one of

your flowers. You see that something is still left."

"Yes," said Frank, "just in the middle! What is it, Father?"

6. "I think I have told you enough hard names



Stamens and Pistil of
a Flower, enlarged.



Stamen of
Lily.



Pistil of the Lily,
the seed-box (a)
at bottom.



Seed-box of Lily
cut open, show-
ing seeds.

for the flower. You will not think of them all, I fear."

"Oh, yes, we will!" said Jane, who seemed quite proud to show that she had not forgotten them. "There are the sepals first, then the petals, and then the stamens."

7. "With their little boxes of pollen," put in Tom.

Their father smiled. "Well done!" he said. "I think we may go on. Well, this part that is left in the middle of the flower is called the *pistil*, and it holds the seed-box.

8. "Gather an orange flower that has dropped its petals and stamens. Here is one! See! a part of the pistil left in it is just starting to grow into a fruit. Although it is so small, the beginnings of the seeds are in it. They are packed in order in tiny chambers, which will grow until they form the large round fruit you know so well."

9. "How wonderful!" cried Frank. "I can see now why this part of the flower has to be well guarded by the rings of flower-leaves."

FRUITS.

1. "Do you remember in which part of a flower the seeds grow?" Mr. Grey asked the children, when he began his next talk with them about flowers.

"Yes, I do," said Frank. "They grow in the middle part, which you said was the pistil."

2. "Quite right," replied his father.

"Well, at the lower part of the pistil there is a place to hold the little seed-buds, or *plant-eggs*, as you may call them if you like.

3. "As the plant-eggs grow and ripen into seeds, the wall of the seed-box which holds them grows too; sometimes becoming very large. In

this way we get the fruit, which is made up of the seed and its covering."



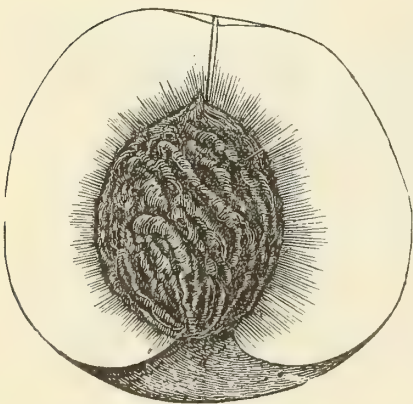
A Bunch of Grapes.

"But there are ever so many kinds of fruit," said Frank.

4. "Yes," replied Mr. Grey, "because there are different ways by which the seeds may be covered and protected.

"The part in which the seed lies may be soft and juicy, as in grapes, gourds, and oranges; or hard and woody, as in nuts; or it may be merely a close skin, as in corn, or a tough kind of bag or case, as in peas and tamarinds."

5. "The mango seed has a hard shell, as well as the soft, juicy part of the fruit to cover it," said Frank.

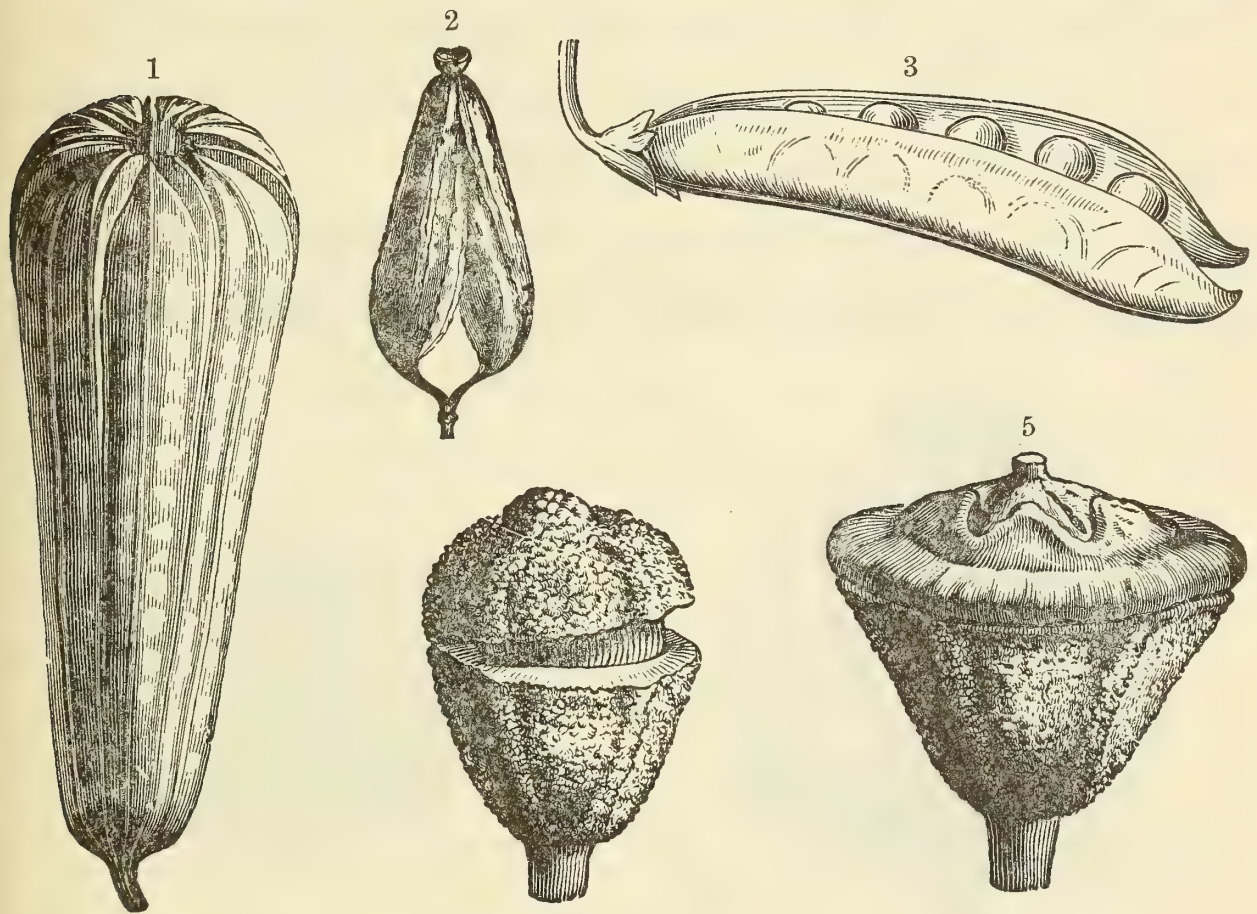


Section of Stone-fruit.

"A fruit of that kind is called a *drupe*, or sometimes a 'stone-fruit'," said Mr. Grey. "In it you will find that the seed-box has three parts—first, the skin of the fruit; next,

the pulp; and thirdly, the hard, woody case holding the kernel.

6. “Some fruits are known as *berries*, such as the coffee, grape, pimento, and orange. These all have a soft pulp, in which the seeds lie; but they have no ‘stone’, and like the drupes, they do not open to let the seeds out.



Pods and Capsules.

1, Birthwort. 2, Cinchona. 3, Pod of Pea. 4, 5, Eucalyptus.

7. “Now, think of some fruits that are dry, or at least not pulpy,” added Mr. Grey.

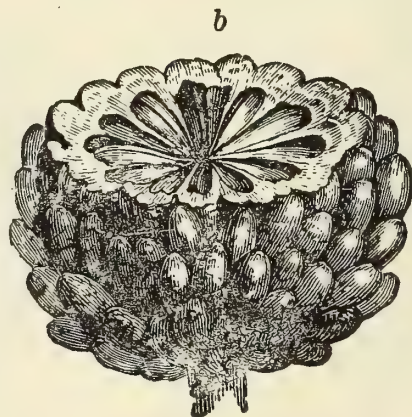
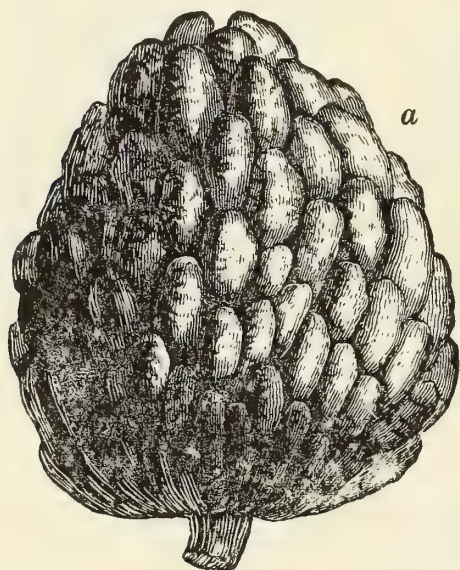
“Nuts, of course,” replied Frank.

8. “Yes; nuts are dry fruits that do not open to let out the seed, but at the proper time the covering rots. Some dry fruits do open when they are ripe; those of the pea, bean, castor-oil,

poppy, and many others do so, though not all in the same manner.

9. "To cast out the seeds some seed-vessels split in halves, or in other ways spread themselves open; or the walls of the seed-box break away. Dry fruits of this kind are known either as *Pods* or as *capsules*. Thus we speak of the pod of a pea, and the capsule of a poppy."

10. "It seems strange," said Frank, "that in some fruits several seeds lie in one case, like the



Sweet-sop.

(a) Whole. (b) Cut across.

peas in the pod; and in others there are ever so many cases for the seeds, as in the orange."

11. "I am glad you notice that difference, Frank," said Mr. Grey. "Here is a sweet-sop, in which we also see each seed lying in its own little chamber."

12. "I must not forget to tell you that some fruits are not formed from a single flower, but

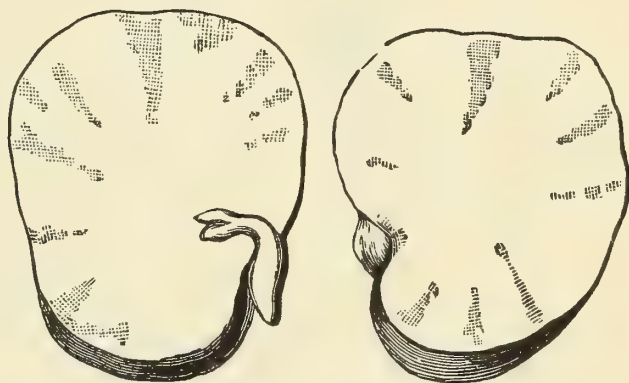
from many; so that in such we have a number of little fruits massed together to form a compound fruit, as in the pine-apple, bread-fruit, jack-fruit, and fig."

SEEDS.

1. Jane and Frank had many other talks with their father, and although they did not remember all he told them, I am sure that the more they heard about plants the more they liked to watch their growth. I will tell you what their father taught them about seeds. This is what he said:

2. A fresh seed is a living thing. It is really a baby plant, with a store of food on which it may feed until its roots can find other food.

3. If you peel from a bean (or pea) its stiff outer skin and its tender inner skin, you will find that the seed easily splits into halves. The halves are the *two seed-leaves*, and they are hinged together. Look closely, and you will find the baby plant. You may even trace its tiny bud,



The two halves of a Bean.

stem, and root. The food on which it will live at first is there, stored up in the two thick, fleshy seed-leaves.

4. As the bean is large, we can see the parts plainly; but many other seeds are formed on this plan, some of them, like the tobacco seeds, being very small.



The Young Bean Plant,
with its two seed-leaves.

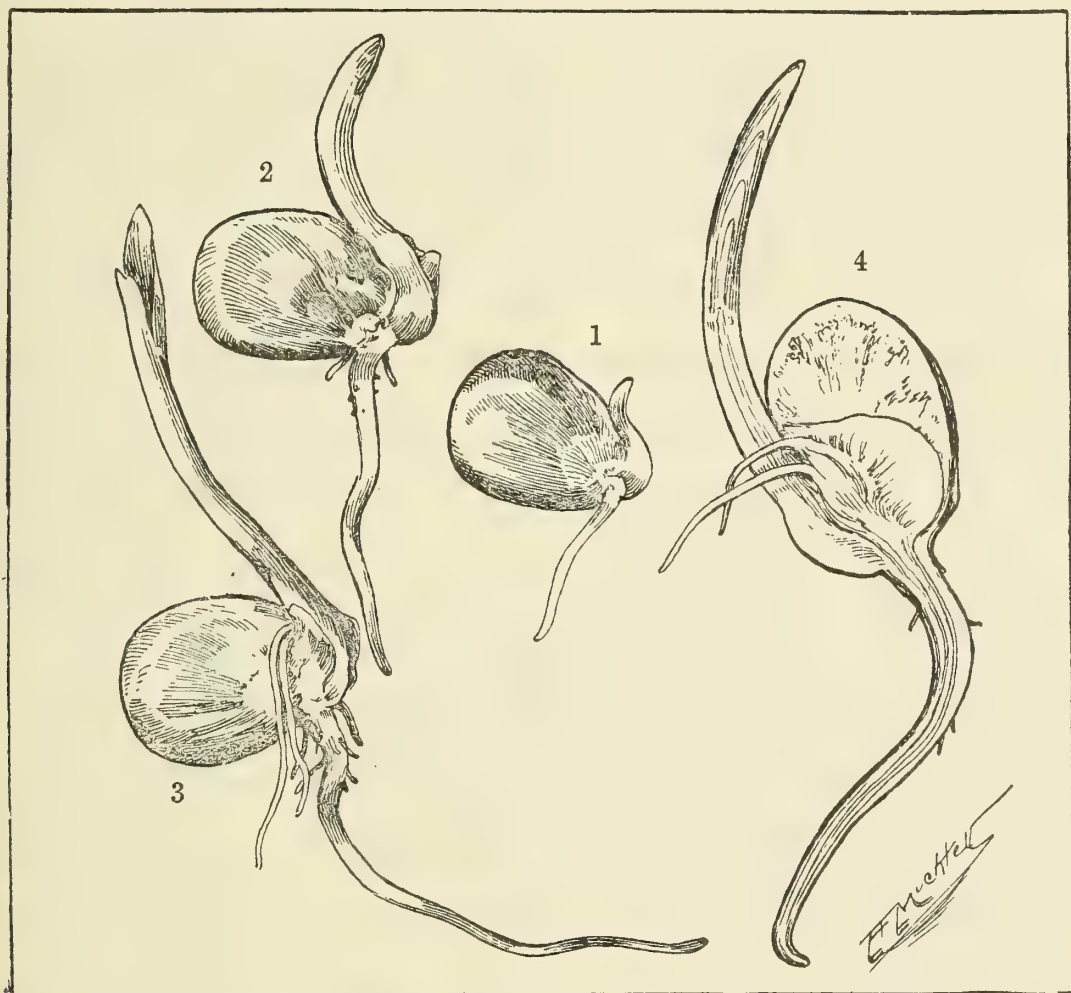
5. Some seeds, however, have only *one seed-leaf*. If we soak a grain of corn to soften it, and then cut it into halves, we find the baby plant lying in the mealy part of the corn. This meal, which we use so much for our own food, is stored in the corn for the baby plant to feed upon.

6. With a knife we may take out the young plant, and find in it the tiny bud and root, but only *one* seed-leaf. This seed-leaf is not thick and fleshy like those of the bean, for it does not hold the food. In the corn seed the food is not laid up in any part of the baby plant, but is placed around it, filling up the grain.

7. We find, then, that some seeds have two seed-leaves, while others have only one. So we sort the flowering plants into two great classes,

by finding out whether they have single or double seed-leaves.

8. In the class of plants with a single seed-leaf we have all the corn and pasture grasses, the sugar-cane, bamboo, palms, lilies, orchids, and



Young Corn Plants. 1, 2, 3, Showing the growth ; 4, the plant cut through downwards.

many other common plants. Their flower-leaves grow in threes, their roots are fibrous, and, in almost all cases, their leaf-veins lie side by side and are not netted.

9. In the class with a double seed-leaf we have nearly all the plants that bear net-veined leaves. These have a tap-root, and stems with a pith in

the middle, and bark on the outside, while their flower-leaves are in fours or in fives.

THE BAMBOO.

1. If I were asked to name some of the most useful plants in the world, I think I should begin with the Grass Family.

2. Now the grass family is a very large one. Of course the guinea grass and other grasses upon which our horses and cattle feed belong to it; so do the corn-grasses, from which we get corn, rice, and other grains; so also do the sugar-cane and the tall and graceful bamboo.

3. I dare say you wonder how these can all be in the same family when they differ so much. I will tell you how they are like each other. Their roots are formed of a bunch of thread-like rootlets or fibres. Their upright stems are jointed, and are hollow (except in the sugar-cane); their leaves are long, narrow, and pointed, having no stalk, but wrapping themselves round the stem by a sheath.

4. The bamboo, like some of the other plants in the grass family, sends out stems under the ground, and from these rootlets grow downwards and leaf-shoots upwards.



5. In this way many upright stems grow close together, forming a thick clump. And very fast they grow, too, some of them becoming more than ten times as tall as a man.

6. Their smooth, shiny stems are perhaps six inches thick near the ground, and, rising straight up at first, they become thinner and thinner towards the top, until they bend over from the weight of their grassy leaves or feathery flowers.

7. For food the bamboo is not as useful to us as the other plants that I have named in the grass family. But it is used in so many other ways that to tell of them all would fill many pages of this book.

8. Where needed, it serves for building houses, fences, and bridges; for ladders, masts, and all kinds of furniture; and for making paper and many other things. In the West Indies seedlings are often transplanted into "bamboo pots", which are easily made by sawing a stout rod into short lengths at the joints. When the seedling is large enough to be planted out the bamboo pot can be split down, and thus the plant may be set free without its roots being disturbed.

9. The bamboo is even made use of for food, the tops of its very young shoots being eaten when pickled.

Let us try to find out why the bamboo is chosen

for so many purposes, and why it serves better than the stems of many other plants and trees.

10. It is straight, so that we can get long and even pieces of many sizes. It is strong, yet light; it splits readily into thin strips; as it is hollow it can be easily sawn through; and, having many joints, it can be cut into useful little vessels. Being very hard on the outside it will not soon wear away; and, being smooth and shiny, it does not need trimming and polishing, as most other woods do. Lastly, whether green or dry, it has no unpleasant taste or smell.

CORN.

1. Corn, which in many parts of the world is called maize, is more widely grown than any grain, except rice. Its seeds are good food for both man and beast; the cobs from which they have been shelled serve as fuel; horses and cattle feed on the green leaves and stalks; and paper may be made from the husks that grow around the ear, or these may be used for stuffing beds or packing fruit.

2. The corn plant grows from four to ten feet high, with a "tassel" or loose bunch of flowers at the top. Seeds do not grow in the place of

these flowers, but from spikes of blossom lower down the stalk. We mostly find from two to five of these spikes on a plant.

3. Pollen, or “flower-dust” grows thickly upon the “tassel” flower at the top of the plant, and the wind carries it on to the lower flowers. Then the seeds begin to grow. But they would not grow if the pollen did not first fall upon the flowers.

4. After the tassel has done its work of giving pollen, it is of no more use to the plant, so it withers away.

The cob is the pithy part which holds the seeds. These grow in straight rows on the cob, but the number of rows is not always the same. We have the eight, ten, twelve, and twenty-four rowed kinds of corn.

5. The seeds are white in some kinds, red in others, and yellow in others; they differ, too, in shape. When they are quite ripe and hard, and the husks have turned white, it is time to gather the crop. This must, of course, be done in dry weather, or the corn might mildew and spoil. The ears are then stored until the corn is needed, as it keeps best if left in them.

6. Men who plant corn have not to wait long for a harvest to reward them for their work. In hot lands, like Jamaica, they may gather a crop

in about four months. Indeed, they need not wait until the corn is ripe, for it is good for eating even while it is young and green.

THE SUGAR-CANE.—I.

1. One day the children at a school in Kingston were seated in front of their teacher, who was telling them about sugar and the sugar-cane. On the table near him were pieces of cane, and bottles holding sugar of different kinds and colours.

2. “In England the West Indies are sometimes called ‘The land of sugar, rum, and spices’,” the teacher said. “You will hear about the spices some day, but this afternoon we will talk about the sugar-cane, which most of you have seen growing.”

3. He let the children tell all that they knew, and what was fresh or hard to them he made plain and easy. I cannot tell all that was said, but I can tell you what the teacher wished them to learn.

4. When a planter intends to have a field of canes, he plants rows of slips, or cuttings. These he takes from the tops of growing canes, being careful to choose only those that are strong and healthy.

5. As the slips grow they send out other shoots, thus forming a clump of canes; and, as in the corn or bamboo, long and narrow leaves sheathe round the stems.

6. Spring and autumn are the best times for



Sugar-cane.

planting, and the canes grow so fast that in little more than a year they are from 6 to 10 feet high, and ready for cutting. When about a year old, they throw out shoots bearing tufts of blossoms. So soft and downy are these blossoms that pillows are sometimes stuffed with them.

7. When the canes are cut, the part left in the ground is called the *stool*. From it fresh canes will grow, which will be known as *ratoons*; those of the previous year being called *plant-canes*.

8. Every year the planter has to take great care of his crop. He must keep the ground loose, and free from weeds; and must look after insects. There is a caterpillar which is fond of boring through the stem, to feed on the sweet pith; and ants will make their nests near the stools, and disturb the plant. These pests the planter must get rid of, or his canes will not thrive.

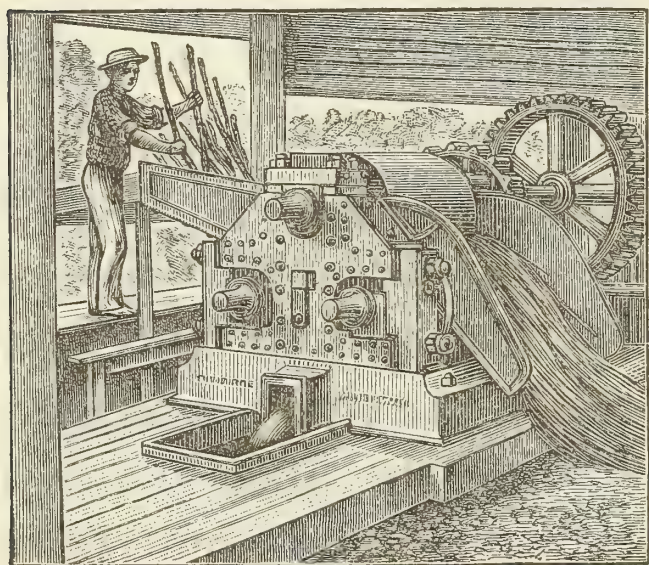
9. You may tell by the stems whether the canes are ripe and fit to be cut. At first the inside of the stem is very soft and moist, with the sap. But when the cane becomes quite ripe it is heavy, its skin is dry and smooth, and the juice is sweet and sticky. The dead leaves are sometimes stripped off, that the air may blow well amongst the canes, and thus help them to ripen.

10. There is a busy scene when the canes are gathered in. As the lower end is very rich in sugar, the men cut them close to the ground. Then the leaves and tops are chopped off, and the canes are cut up into pieces short enough to be tied into bundles and carried to the mill.

THE SUGAR-CANE.—II.

1. Some of the boys thought that it must be easier to grow the canes than to make hard lumps of sugar out of their juice.

2. While showing them the different sugars in his bottles, the teacher pointed out the two kinds that are chiefly made in the West Indies. One kind was in whitish and sparkling little pieces, called crystals; the other was *muscovado* or brown sugar, such as is sent to England and other countries to be made into white “loaf” sugar. The boys were told how muscovado sugar is prepared.



Sugar-mill.

3. As soon as the canes reach the mill, they are crushed between large iron rollers, to force out the juice. This drops into a large tank placed beneath the rollers, and from thence it is either pumped or led along into receivers.

4. After a little lime has been thrown into it, it is heated until a scum forms, which can be easily skimmed off. In this way the juice is cleansed.

5. Next the juice is run into large, open pans, in which it is boiled for some time. As the steam passes off, the juice thickens into a syrup. Still the boiling is kept up, until the syrup is ready to turn into sugar, when it is put into flat pans to cool. As it cools very fine grains appear, and there is the sugar at last. But the whole of the syrup will not form into grains, and the part that will not do so must be taken from the rest.

6. So the sugar is “potted”; that is, it is put into large casks, called hogsheads, which have holes at the bottom through which pieces of green plantain stalks are often placed. There it is left for three or four weeks, during which time the syrup that will not ‘grain’ slowly drains out. You know it very well as *molasses*. Sometimes machines are used to draw off the molasses, and then much time is saved.

7. What is left in the casks is muscovado sugar, which is ready to be shipped to other countries. The men to whom it is sold are called sugar-refiners, and they *refine* it; that is, they take from it anything that is not pure sugar, and make it white, and ready to be used in sweetening tea, coffee, fruits, and other foods.

COFFEE.—I.

1. “Do you know what this is, John?” said a teacher one day, as he tossed a round, dark-red berry into John’s hands.

John felt that the berry was soft, and knew that it was a ripe fruit. “It is a coffee-berry, sir,” he said.

2. “Cut it open,” said the teacher. And he passed a knife to John.

This was soon done. John cut through the pulp of the soft berry, and within it he found two small hard seeds, like little beans.

3. “There are the coffee-beans,” said the teacher “How snugly they were packed in their soft bed, with their flat sides close to each other. It is from beans like those that we get coffee. Here is some coffee ready for use. Pass it round the class that all may see it.”

4. “The coffee is brown, and the seeds are not,” said one boy.

“And they do not smell like coffee either,” said another.

5. “That is true,” said the teacher. “But much has to be done to the seeds before the coffee is fit for use in the coffee-pot. First there is the curing, by which the seeds are cleared of the pulp and skin, and are dried. When that has

been done they can be sent in ships to England and other countries.

6. “Coffee that has been well cured is quite dry, very hard and brittle if bitten with the teeth, of a fine deep-green colour, and a strong and



Branch of Coffee Tree—in full bearing.

pleasant smell. For such coffee a much higher price is paid than for that which has not been properly cured.

7. “Before the beans are used they must be roasted. This makes them brown and crisp. Afterwards they are ground in a mill. The

roasting gives to the coffee its pleasant scent, and brings out its nice taste. So if the *drink* is to be good, the roasting must be very carefully done."

8. "I have often seen coffee-trees," said one of the boys.

"I dare say you have," replied his teacher, "for there are plenty in Jamaica. I am ready to take you all to a coffee plantation to-day if you would like to go."

9. "Oh, yes, please!" cried the boys, in glee.

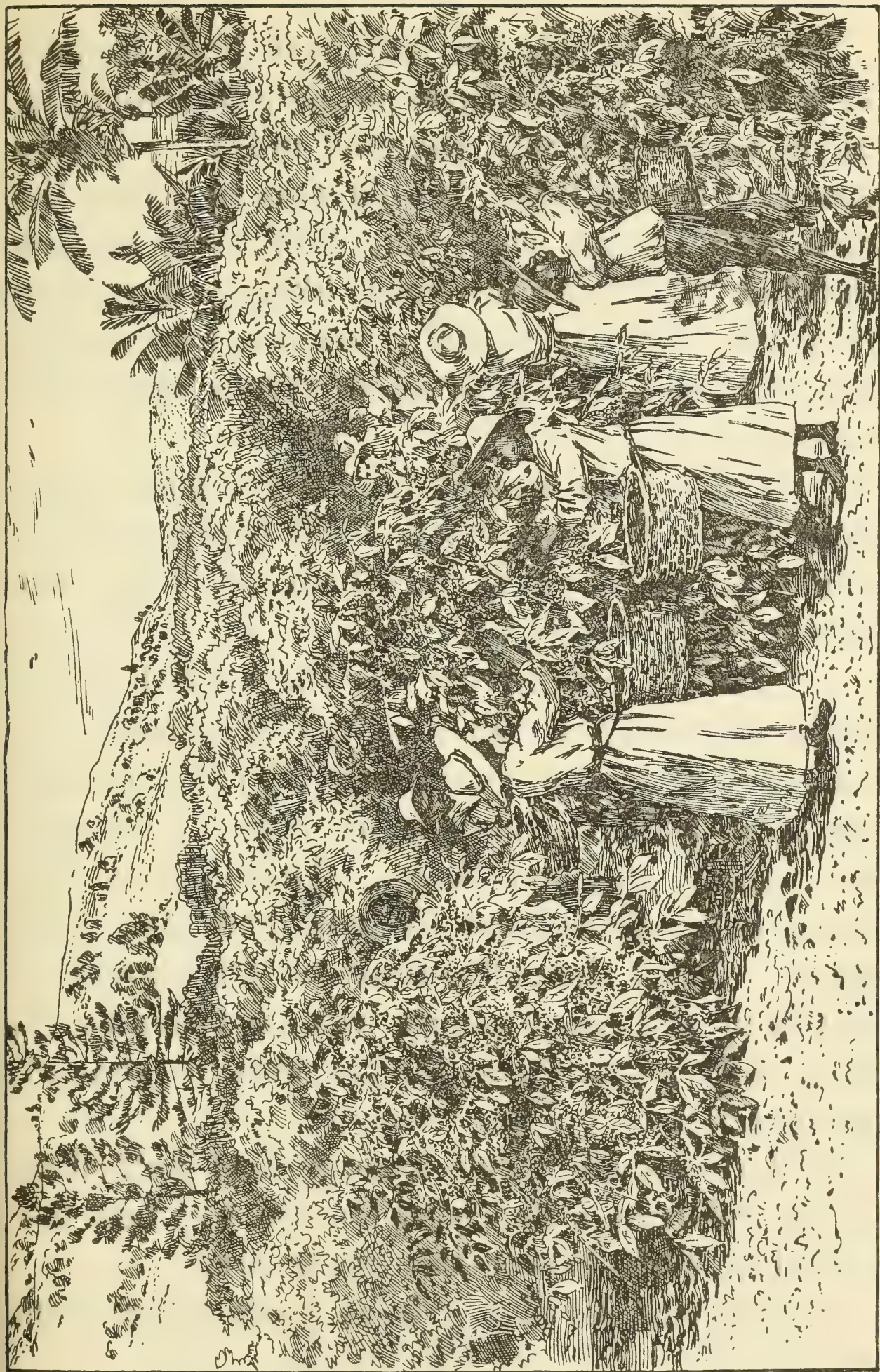
"How pretty!" they said, when they saw the well-trimmed trees in straight rows. "There are some people picking the ripe fruit. May we go and watch them?"

10. "Soon we will," said the teacher. "But first I want you to look well at the trees. Come near this one. See its dark-green, shiny leaves.

"And see the clusters of fruit, growing close round the joints of the branches. Some of the fruit is green, and some has turned red and ripe. Here are a few white flowers too. Smell them. You will find that they have a very pleasant scent."

COFFEE.—II.

1. "The coffee-trees are not very big," said John.



Coffee Picking.

“No; that is because they have been topped. As soon as a tree is three or four feet high, its top is nipped off, and the side branches left to grow and spread out. If this were not done the trees would grow very tall, with long, trailing branches which would most likely get broken when the fruit was picked. Besides, the trees do not catch the full force of strong winds when they are kept low.

2. “Coffee-trees need great care to make them grow well. Some day you shall learn how the ground is made ready for them, and how the young plants are reared.

3. “Though coffee-trees like the warmth of our island, they do not like the clear, scorching rays of the sun when they are young. For that reason, except in the high mountains, rows of bananas are planted amongst them. These screen the young coffee-trees from the sun, and give them shade. When the coffee-trees are old enough to bear fruit, the shade plants may be taken away; for a fully grown tree thrives best in the full sunlight.”

4. The boys and their teacher now walked on to see the fruit gathered. On the way one boy picked up some beans from the ground.

“Look, sir,” he said; “have these fallen from the trees?”

5. "Yes; and I will tell you why. You see that they are still covered in their skin, or parchment, as we call it. But they have lost the pulpy case in which they grew. A thief has eaten it."

6. "A thief!" cried little Tom, one of the best boys in his class; "I hope the planter will catch him."

7. "Oh! he catches some of the thieves," said his teacher, laughing. "They are little four-legged ones; they are rats, which are very fond of the sweet pulp of the berry. The seeds they leave are known as 'rat-coffee', and are not worth as much as those that are picked from the tree.

8. "The coffee-trees have several enemies which the planter has to look after. Sometimes a kind of mould grows on the leaves. Sometimes, too, many small flies or other insects visit the trees. If the planter did not then work hard to cleanse the trees, they would die."

9. The boys watched the pickers at work for some time. Then the teacher said "Good-bye" to the planter, who asked him to bring the boys another day to see his cocoa plantation.

COCOA.

1. It was near Christmas-time when the teacher and his boys went to the cocoa plantation. The large fruit pods were very pretty in their red and yellow colours, and seemed quite ready to be gathered. They hung on very short stalks from the stems and thick branches of the trees.

2. The planter told the boys why the trees grew so well after he had planted them. He said:

“You see that they are in a valley, so that they are in a sheltered spot, and they are shaded by those tall trees. The soil is deep, too, as it ought to be, because the trees have long tap-roots.

3. “This is their sixth year, and they are now in full bearing. When they were young, and much smaller, I had bananas between the rows, to shade them, and to give fruit until the cocoa crops were ready.”

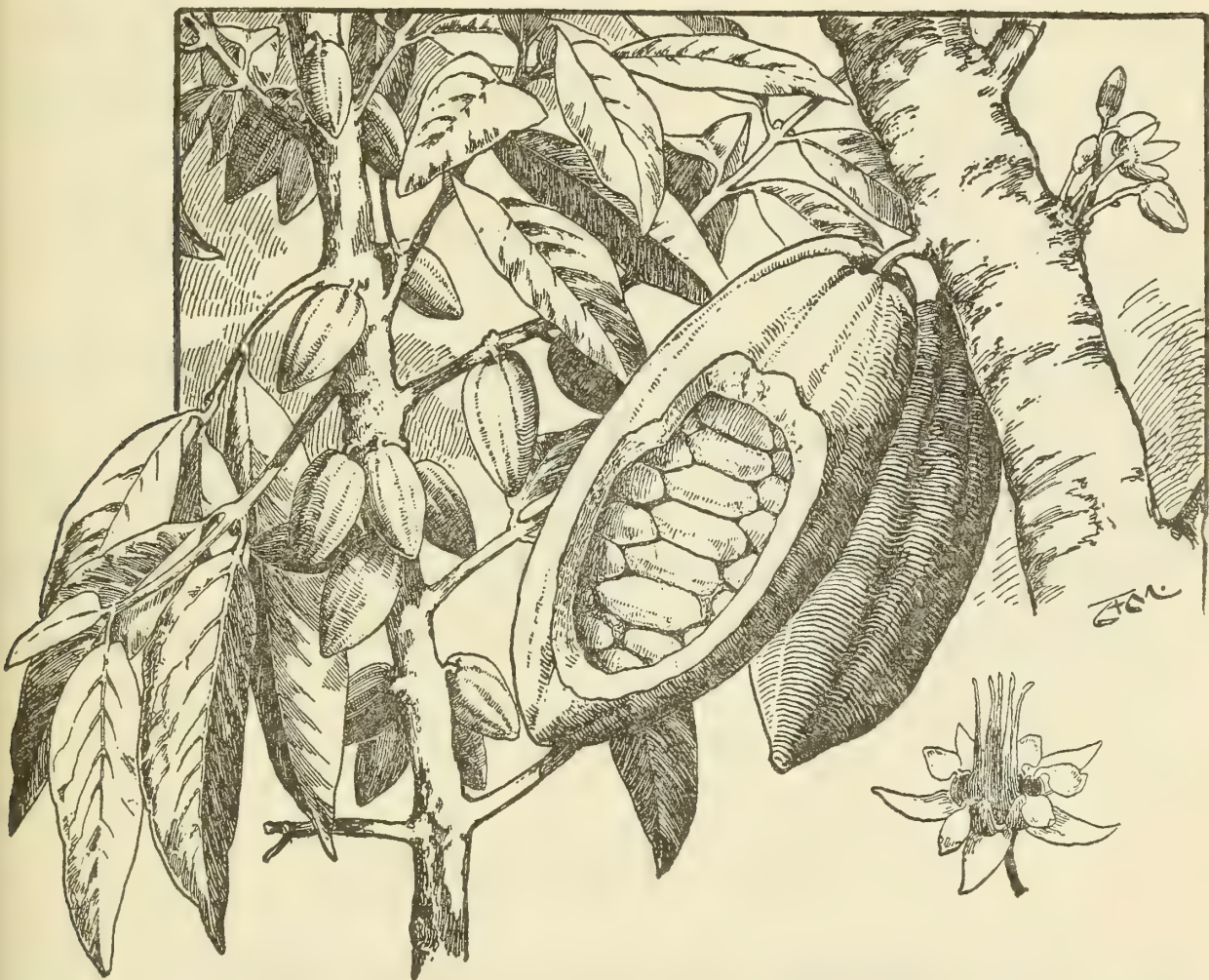
4. “You have two gatherings in a year, do you not?” asked the teacher.

“Yes; the chief crops are at Easter and Christmas, but the trees bear more or less all the year round,” was the reply.

5. The boys watched some men cutting the fruit. The pods were cut off by a sharp knife; great care being taken not to pull the stalks on

which the pods grew from the tree. If the “eye”, from which the stalk springs, is injured, the tree never bears fruit in that place again.

6. The planter split a pod open that the boys might see the beans. There were about thirty of



The Cocoa Tree—Foliage and Fruit, one pod opened to show seeds.

these, pale in colour, and neatly packed in five rows.

7. “These are the beans from which cocoa and chocolate are made,” said the teacher. Some of the boys tasted them and did not like them, because they were bitter.

8. “When we ‘sweat’ the beans much of the

bitter taste will pass off," said the planter. "We shall place them in heaps or in boxes in a close room for five or six days, and that will cause them to become warm and moist. Sweating cleans them too, and gives them a rich brown colour. Afterwards they will be dried until the skins are hard and crisp, and the beans are ready to break easily into 'nibs'."

9. As the boys walked home, their teacher said:

"There is much more cocoa grown in Trinidad than in our island. I should like you to find on a map these names—St. Mary, Portland, St. Thomas, and St. Catherine; those are the parishes in which most of the cocoa is grown in Jamaica."

THE ORANGE.—I.

1. In an orange there are three parts to look at—the rind, the pulp, and the seeds.

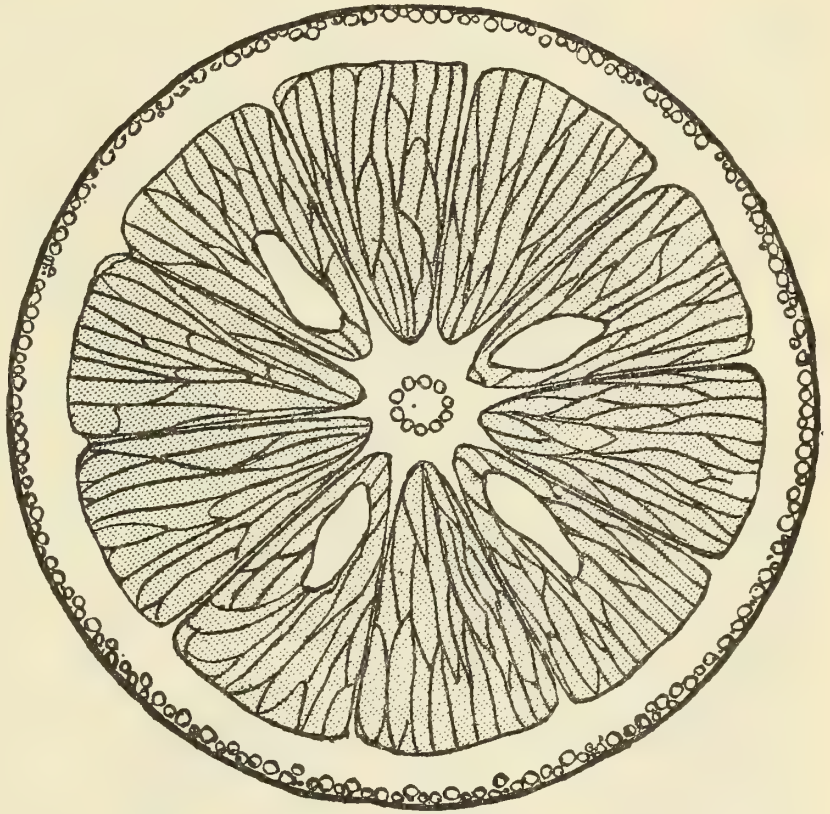
First we pull off the rind, and find that its bright golden colour is only on the outside; within it is white and spongy. If we squeeze it we see on the outside tiny beads of oil, which we have forced out of the little bags in which it was hidden.

2. The oil has a strong scent, and it may be

that this is of use to the fruit in driving off insects that might try to get to the pulp.

3. When the rind is off we may tear the fruit into eight or ten parts, all of the same size and shape. In each part a very thin, white skin holds the yellow, juicy pulp in which seeds lie hidden.

4. Look very closely at this pulp. You may find that it is made up of a great number of tiny bags of juice. These bags are plant cells. Every



Section of an Orange.

part of every plant is built up of cells, and in the orange fruit these are large enough to be easily seen.

5. Pick out one of the seeds. You find it white and hard, with a tough, leathery skin. The orange belongs to the berry class of fruits. It is put in that class, because its seeds lie loose in the pulp, and the rind does not split open to let them out.

6. The tree belongs to the same family of plants as the grape-fruit, lime, citron, shaddock, and lemon, all of which have pulpy fruits, with a thick rind.

7. The orange is very much liked in England and other countries where there is not warmth enough for its growth, and many ship-loads are taken to those parts every year.

8. If the fruit is to be sent away it should be picked before it is ripe, though, of course, not before it is full-grown. It should

always be cut, not pulled. People who gather and pack it ought to take care that it is quite dry, and not bruised in the least, or it will soon rot.

9. Where the work is carried out well, the oranges are sorted by their sizes, and each one is wrapped in thin, white, soft paper. Then they are carefully put into boxes made for the purpose, in



Citron.

which they are packed in such a way that they cannot be shaken about.

THE ORANGE.—II.

1. In no part of the world does the orange-tree grow better than in the West Indies, where many single trees each give 3000 to 8000 oranges in a year. The Manchester oranges are famous for their size and good flavour.

2. The trees do not grow well in sandy soil, and the best crops will be given only where the ground has plenty of lime, and is rich with the decay of trees and plants, or well fed with manure.

3. An orange-tree has very long roots, by which it is so firmly fixed in its place that heavy winds are not likely to blow it down, though they may spoil its flowers and fruits.

4. The tree cannot bear cold at all, and thrives best when it stands in the full sunshine. If other trees overshadow it too much the stems grow thin and weak, and the fruit is small and sour.

5. In the West Indies young orange-trees are raised from seeds. But the trees yielding the best fruits are grown by cutting a shoot from a tree that bears good and sweet fruit, and budding or grafting it upon a sour orange-tree. The shoot

then grows as a part of the sour tree, but bears fruit of its own kind.

6. I hope you will plant some fresh orange seeds, and watch their growth. Then you may see the two seed-leaves, upon which the young plant feeds at first.

7. An orange-tree takes six or seven years before it bears good crops, and during this time it ought to be well pruned. Round the stem a number of shoots spring up, and these, as well as the low side-branches touching the ground, should be cut off.

8. As early or very late oranges mostly fetch the best price, men do all they can, by pruning and by giving manure, to obtain fruit when it is not plentiful elsewhere.

9. Much harm is done to the orange-tree by the scale insect, which makes the tree unhealthy and unable to bear a good crop. To free it from this pest, its branches and stem are brushed over with water in which tobacco or kerosene and soap have been soaked and mixed.

THE BANANA.

1. A grand treat was in store for Fred and Harry Brown. They were to ride by coach to Annotto Bay with their uncle, and to stay for

two or three weeks at his house. The long ride of over twenty miles was a delight to them, for they saw the crops of bananas, oranges, cocoa-nuts, and other fruits, and the people busy in the fields.

2. "St. Mary's parish, in which I live, is famous for its fruits," said Mr. Hill to the boys, as they



The Banana—Fruit and Foliage.

drew near their journey's end, and passed carts laden with fruits for the market.

3. "Look at the bananas in that field," he added. "They have been planted there to shade those young cocoa plants. Their large broad leaves can do that very well."

“What famous clusters of fruit!” cried Harry. Then he asked: “Are the banana plants reared from seeds, Uncle?”

4. “No,” replied his uncle, “it is not grown from seeds; it has an underground stem which sends up side-shoots. There would be a large clump of these if they were left to grow, but it is best to cut most of them away, leaving only three or four. The suckers that are thus cut away may be planted in other places.”

5. “The leaves grow very fast,” said Fred. “That is why they become so big. Father says that a leaf sometimes grows several inches in one day.”

6. “That is true,” said Mr. Hill. “If you watch the growth of a banana shoot you will see a long green roll, formed of two leaves. As these unroll, other leaves appear, until, in time, the beautiful, spreading crown is formed. The straight, tall stem of the plant is built up of the leaf-stalks, which are rolled one over the other.”

7. “How long is it before the fruit is ripe?” asked Harry.

“The first crop is ready in less than a year from the time of planting,” said Mr. Hill.

8. “A beautiful spike of flowers springs from the crown of leaves. At first the flowers are in a sheath; when that falls off the tiny bananas

may be seen, each with a small yellow flower at its tip.

9. "The banana is indeed a handsome and wonderful plant. The plantain is very much like it, but is usually eaten as a vegetable or as meal, while the banana is greatly enjoyed as a ripe fruit, and is eaten uncooked."

10. "The bananas which we saw on their way to the market just now were green," said Fred. "They were not ripe."

11. "Oh, no!" said his uncle. "Those that are sent to other countries have to be cut before they are ripe, lest they should spoil on the way. The men have to handle the fruit very gently, for the least bruise will cause it to decay. Most of the Jamaica bananas are sent to America. No doubt we shall see some put on board ship at Annotto Bay."

THE PINE-APPLE.

1. "What fruit do you like best, Uncle?" asked Fred one day.

"Ah! that question puzzles me," said Mr. Hill. "I could name many fruits that are very nice. Perhaps I enjoy the pine-apple as well as any of them, though I like the mango, and guava, and many other fruits too."

2. They talked together for some time about the fruits, and at last Mr. Hill said: "I will send to buy a pine-apple, and then we can taste it as well as talk of it.

3. "Pine-apples are grown in great quantities in the Bahama Islands, and there are a good many in Jamaica too," he added. "To-morrow we will go where some are growing. But be careful then; for they are well guarded, and you may be sorry if the ripe fruits tempt you to go too near them."

4. "Why, Uncle?" asked Fred.

"Because of the strong prickles on the edges of the leaves. When working amongst them people often wear strong leggings and gloves, to protect themselves."

5. What are the flowers like?" asked Fred.

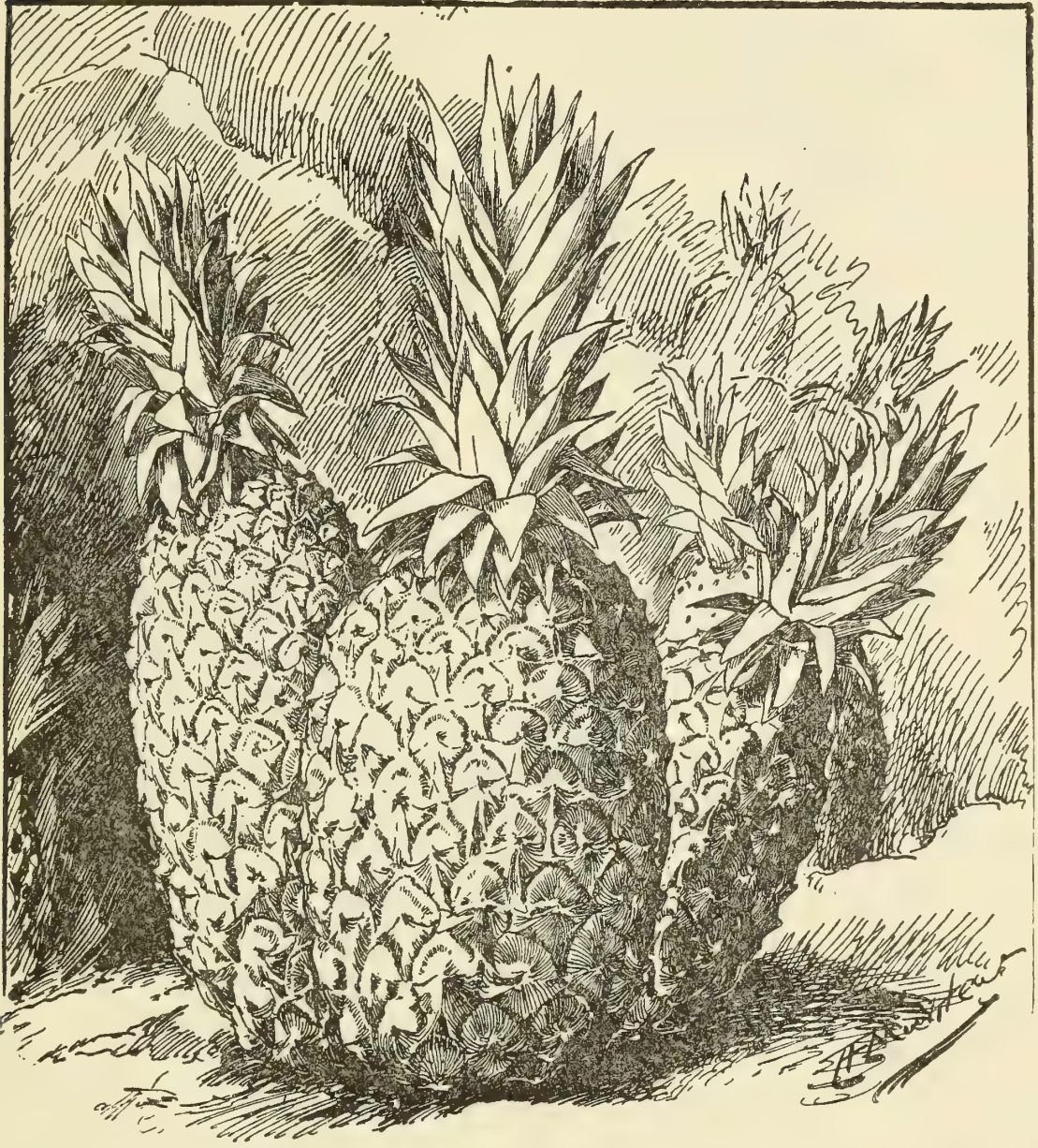
"They are blue, and grow very close together on a spike which bears a tuft of leaves above it," replied his uncle.

"That explains why the fruit has a green tuft at the top, I suppose," said Fred.

6. "Yes," said Mr. Hill; "and if that tuft, or crown, were put into the ground, a plant would grow from it. But pine-apple plants are not often raised in that way. The suckers that grow round the first plant are taken to start new ones. That is a better way than sowing seeds."

“What are the seeds like, Uncle? I have never seen them,” said Fred.

7. “Ah! Fred, I see you are wanting to have



Pine-apples.

our pine-apple cut open. Very well. We will taste a slice, and look for the seeds.”

After the slices had been cut, Fred looked again and again at the inner part of the fruit, but could not see any seeds.

8. "You do not look in the right place," said his uncle. "Very often seeds are not to be found in pine-apples, but there are some in this one. Very small they are; you will find them close to the outer skin. Do not think that all fruits carry their seeds in the middle, as the



Strawberry Fruit and Stalk.

orange does. The strawberry is another example of fruit with its seeds on the outer part.

9. "This pine-apple has been bruised," added Mr. Hill. "When pine-apples are cut they should be very gently handled and packed, or they will soon rot. Of course they are cut before they are ripe if they are for the English or American markets."

THE MANGO.

1. "Take care of the juice, boys!" said Mr. Hill, laughing, as he came upon Fred and Harry,

each sucking a ripe mango to which they had helped themselves from the tree above them. The boys were doing their best to swallow the



The Mango.

juice, but I fear that their clothes got a good share of it.

2. "I have heard that the proper time for eating mangoes is when we are in a bath!" said their uncle.

"We do not wait for that, Uncle," said Harry;

“we can enjoy them whenever we get the chance to eat them. They are so good!”

3. “Well, the mango is certainly one of the best fruits we have,” said Mr. Hill. “People who do not live in the West Indies, or other warm parts of the world, cannot know how delicious it is.”

“Do not the ships take any to them?” asked Harry.

4. “The ripe fruit cannot be sent a long distance, for it would decay on the way; so in many countries the people can only have mangoes that have been picked green, and preserved.”

“We have plenty of mangoes in Jamaica,” said Fred.

5. “Oh, yes! the trees are to be found all over the island,” said his uncle. “And very pretty trees they are, with their spreading branches, and their long, shiny leaves.”

“Their flowers are not very gay,” said Harry.

6. “No, the flowers are small, growing, as you know, in bunches at the end of the branches. But if there were no flowers, there would be no fruit.”

“How is it that ripe mangoes are not all the same colour?” asked Fred.

7. “It is because a new kind of mango has now and then been grown from seed. Seeds,

when sown, mostly give plants exactly of the same kind as the one on which they grew. But it may happen that the new plant differs a little from the old one, and if it is better, it is taken care of, and young trees are reared from it. In this way we often improve our fruits, or leaves, or fibres, or whatever else we wish to get."

8. "Here is the seed," cried Fred, who had managed to crack the "stone" which came from his mango.

"Yes," said his uncle. "How well it was taken care of before you broke into the seed-box!

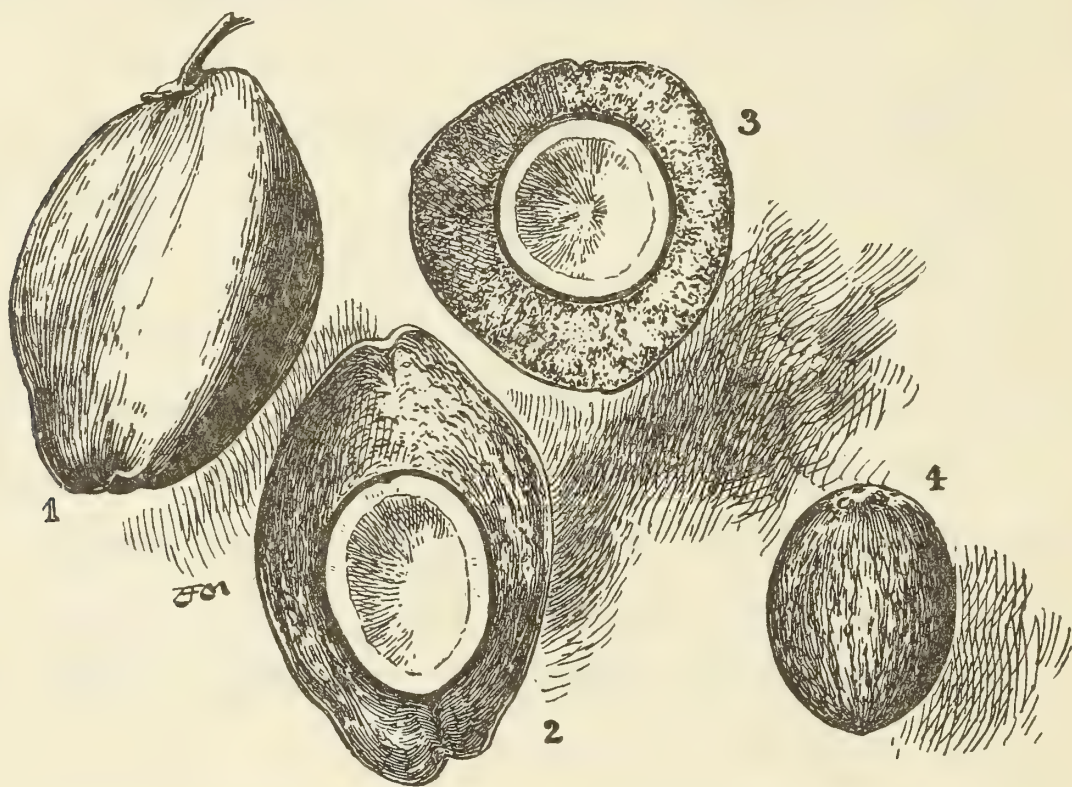
9. "The pulp clung closely to the 'stone', or woody case, which you had to crack before you could get at the kernel. So you see there were no less than three different coverings—the skin, the pulp, and the 'stone'."

THE COCOA-NUT PALM.

1. I have heard of a boy who cut a drum open to find where the sound came from. That was not very wise of him. But I think it would be a good thing to saw straight through a cocoa-nut and its husk, to see just how it grows.

2. First you find the thick, outer husk, made up of a mass of rough, brown fibres. Next you

have the hard shell of the nut; and fitting closely inside it, is the white hollow seed or kernel, which holds some milky-looking water. The oily kernel is the store of food laid by for the baby plant, which lies in it, to feed upon.



1, Fruit of Cocoa-nut Palm ; 2, Fruit cut through downwards, showing nut and outer husk ; 3, Fruit cut across ; 4, Cocoa-nut.

3. But what a large fruit it is to have only one seed! It is, indeed, the largest nut that grows.

The tree which bears it is often called the “Prince of Palms”, and there is no plant in the world that gives us so many useful things.

4. The trunk is used for building, and the hard, outer part, which goes by the name of “porcupine-wood”, is beautifully marked. The leaves are used for thatching, and for making baskets and

mats, and the fruit is well known for the food and drink it gives.

5. The fibres of the husk are called the “coir”; and from this ropes, mats, brushes, bedding, and many other things are made. From the kernel we get oil, which is put to use in making soap and candles. After the oil is pressed out, the kernels are good food for cattle. These are only a very few of the useful things we get from the cocoa-nut tree.

6. It seems to grow best near the sea, and thrives even when its roots are washed by the water. Most palms grow straight, but the cocoa-nut palm is often curved and twisted. Along the shore it bends its head towards the sea, as if to meet the force of the wind, and to enjoy the breeze from the water.

7. When young trees are needed for a cocoa-nut plantation ripe seeds are chosen and sown, and as soon as they sprout the young plants are set out. It will be five years before they flower, and at least two years more before they fruit well.

8. Then they make up for this long time, by giving fruit all the year round; and one tree may yield from 50 to 80 nuts in a year.

I think you will say that the cocoa-nut palm well deserves its name—the “Prince of Palms”.

THE BREAD-FRUIT.

1. Just over a hundred years ago, a ship was sent to the South Sea Islands by the King of England, George the Third, for a cargo of young trees of a very wonderful kind. They were bread-fruit trees, and it was thought that the people of the West Indies would be glad to have some of them, that they might be able to gather the fruit for "bread".

2. So the ship took about 350 of the young trees to Jamaica, and ever since that time the bread-fruit tree has grown in the islands of the West Indies.

The tree is common now in the islands, and the fruit is sometimes used either as bread or to eat with meat. It is a round fruit, as large sometimes as a child's head. It hangs from a thick, fleshy stalk, and its green rind is very rough and uneven.

3. Before the fruit is ripe the rind is filled with a kind of pith, which is very white and mealy. In time this becomes pulpy and juicy, in the same way as a banana does when it ripens.

4. We do not wait for the fruit to get juicy if we wish to eat it; but we gather it while it is mealy. When gathered, it ought to be baked as soon as possible, or it will be spoiled by becoming soft.

5. Fruit may be found on the trees several months in the year, and the crops are so large that there is plenty of bread for those who wish to use it.

6. At a height of about 10 or 12 feet from the



Branch, Flower, and Fruit of the Bread-fruit Tree.

ground the lower branches spread out straight, while above them the branches get shorter towards the top, giving the tree a good shape.

The leaves are long and wide, with a bright-green colour, and very smooth.

7. If you look closely at the flowers you may

see two kinds on the same tree. It is the kind with the little round head that gives the fruit.

8. The wood of the tree is soft, and filled with a milky juice, which is the sap. Wherever a hole is made in the tree the sap will flow out; and it is so sticky that it may be drawn into long threads, like molasses. This sap, or juice, is sometimes used as a cement to fill up cracks in vessels that are made for holding water.

THREE COMMON FRUITS—THE GUAVA, STAR-APPLE, AND CASHEW.

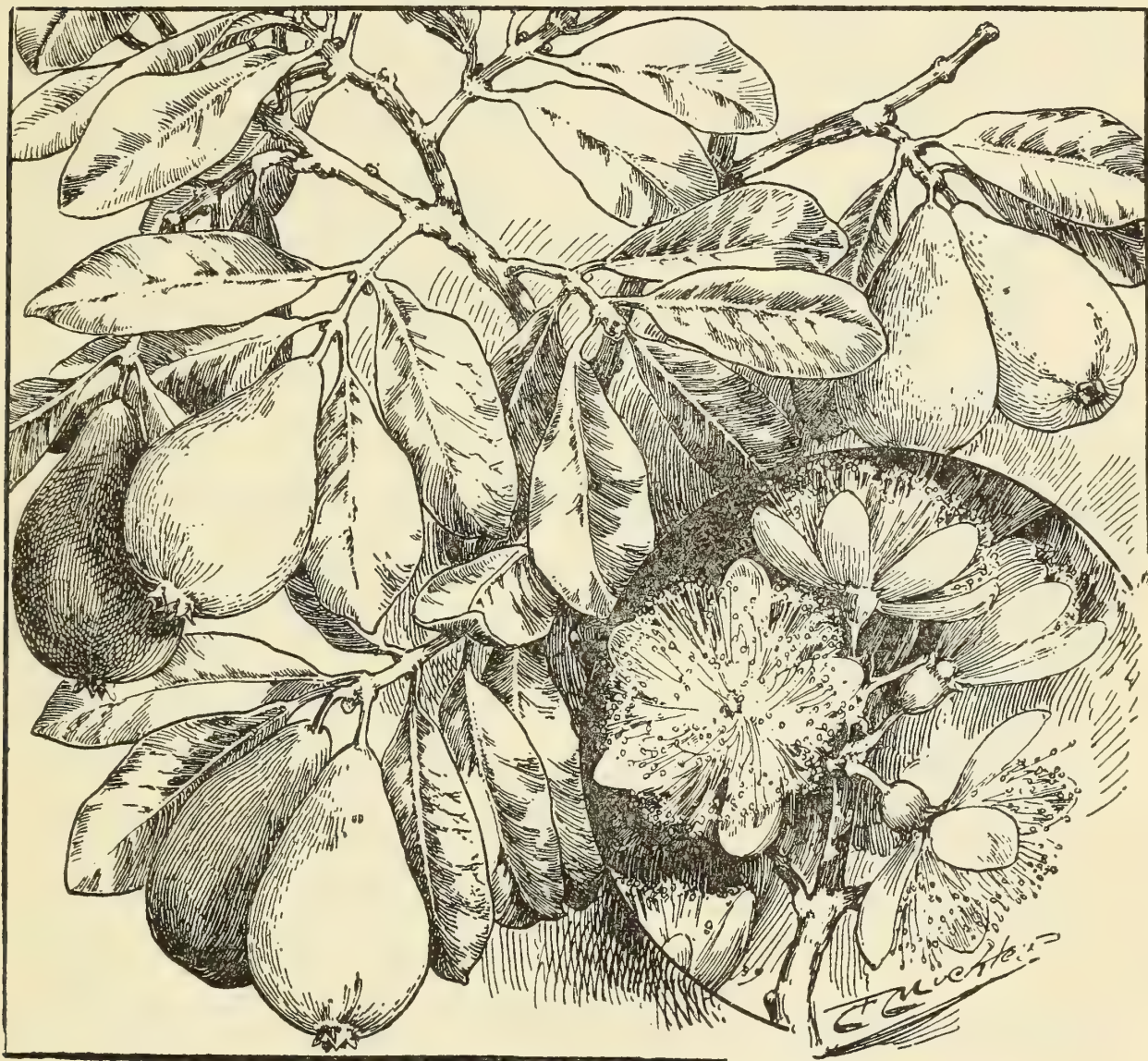
1. The *guava* is well known amongst the fruits of the West Indies. The tree on which it grows belongs to the same family as the clove, pimento, and pomegranate.

2. There are several kinds, but those best known are the white, the red, and the mountain guava.

The white guava, if growing wild, is a shrub, but, if properly tended in gardens, it often grows to a large and handsome tree, with very hard and tough wood. It bears simple leaves, white flowers, and a pretty fruit, rather larger than a hen's egg.

3. The smooth, thick rind of the guava fruit is

of a pale-yellow colour, and within it we find a pinkish pulp with several seeds. The fruit tastes sweet and pleasant, and guava jelly, which is



The White Guava—Flowers, Foliage, and Fruit.

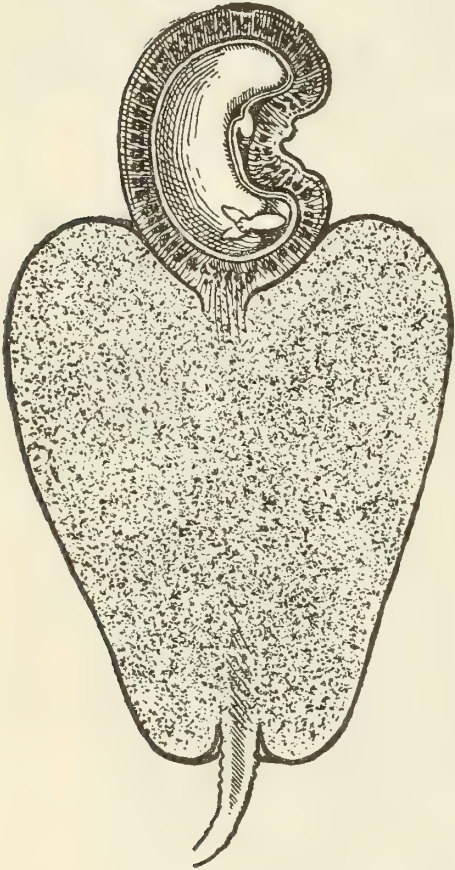
made from it, is one of the finest preserves sent out from the West Indies.

4. The red guava is a larger tree than the white, with a small fruit shaped like a pomegranate.

The mountain guava, found in the woods of Jamaica, grows to a large tree, with wood of a

beautiful grain. It is not much used in building, but is very good for gun-stocks and other things for which hard, tough wood is needed. The fruit, however, is only about as large as a cherry, and is not so good for eating as the common guava.

5. The *star-apple*, like the guava, is one of the



Fruit of the Cashew-nut Tree,
cut through downwards.

native fruits of the West Indies. It grows on a spreading tree, with slender branches, and is a large green or purple fruit of the size of an apple. Inside, the fruit has ten parts, each having a black seed lying in the midst of a jelly-like pulp. The leaves are dark-green above, and are of a beautiful golden or copper colour beneath.

6. The *cashew* is a very handsome tree. Its fruit is a nut, at the end of a fleshy, pear-shaped stalk, which is very nice for eating. From the bark a milky juice may be drawn, which makes a very good ink for marking linen.

7. But the tree is best known for its nuts. Between the outer shell of the nut, and the inner shell which covers the kernel, there is a thick, black oil, which will raise blisters on the skin,

and will cause pain if you happen to crack the shell in your mouth. This oil is sometimes used to cure corns, warts, and sores, but it must be used with great care.

8. When the kernel is fresh it is full of a sweet, milky juice, and has a very nice taste; when older it is mostly roasted before it is eaten, and is used instead of almonds.

GINGER.—I.

1. The ginger plant has an underground stem which thickens out in such a way that you might easily mistake it for a root, unless you noticed the leaf-buds upon it. The real roots, however, are the threads or fibres given off by this underground stem, which is often called the *root-stock*. It is for the sake of its root-stock that the ginger plant is grown.

2. Like the banana it has long, pointed leaves, whose ribs run side by side, and whose lower parts sheath round the stem, thus building it up.

3. To raise fresh plants, a root-stock is cut into small pieces, each of which must have a shoot-bud upon it. These are dropped into small holes, about a foot apart, and the ground is then covered thickly with dead leaves, straw, and manure, to keep the young cuttings moist and cool.

4. The planting is done in March or April, and in a few months the ground becomes covered with leaf-shoots which grow until they are about



The Ginger Plant—showing the “Root-stock”.

3 feet high. In September spikes of small yellow and purple flowers appear.

5. When the flowering is over, the leaves begin to wither. and the root-stocks increase fast in

size and weight. At last, in January or February, the withered stalks show that it is time to gather in the crop.

6. It is in the very deep black soil of the forest that the best ginger can be raised. For this reason the ginger planter often gives up the land after he has raised a crop, and clears another piece of forest ground on which to start fresh plants. Although very good ginger may be grown in this way, we lose many fine and useful forest trees that have taken a great number of years to grow.

7. Ginger can be grown, in the same places, year after year by leaving pieces of the root-stock in the ground to ratoon. But the ginger from ratoons is not so good as "plant-ginger", and it gets poorer year by year. So at last the ratoons are given up, and something else is planted in their place, until, after a few years, the land is ready to bear a ginger crop again.

GINGER.—II.

1. Let us see how the ginger is made ready for market. The *races* or *hands* (as the odd-shaped root-stocks are called), having been dug up, are washed free from soil, and cleared from their thread-like roots.

2. They have then to be scraped with a “ginger-knife”, which is made for the purpose. This has a very thin and narrow blade so that it can pass between the “toes”, as the branching pieces are called. Great care is taken not to break off the “toes”, as the ginger would not then sell for a good price.

3. When the dark outer skin is all scraped off, the ginger is thrown into a bowl of clean water and well washed. Afterwards it has to be dried in the sun for six or eight days.

4. When once the drying has begun the ginger must not get wet again, or it will mildew, and spoil. It is therefore taken in every evening and spread out again next morning, and in the middle of the day the pieces are all turned over, that every part may get its share of the sun’s heat.

5. In this way it is made quite dry and hard, and ready to be packed in bags or barrels for the market.

6. Ginger that is thus prepared is called “white” or “scraped” ginger. When dry and hard, ginger is used as a spice, but it is also very often eaten as a preserve.

7. To make preserved ginger the tubers or hands are used when young, and when their shoots are not more than 5 or 6 inches high. As the tubers grow older they become woody or

stringy, and are then unfit for making into preserve.

8. The ginger is first scalded with boiling water, and peeled; then it is put into syrup, and left to soak. This causes the ginger to become bright and clear, and it is then put with syrup into jars, ready to be sold.

PIMENTO (Allspice).

1. One day Mr. Hill took his nephews, Fred and Harry, with him into the neighbouring parish of St. Ann. It was in the month of July, so they saw the pimento walks in their full beauty. They stopped to look at some trees whose small white flowers shone thickly amongst the dark, shiny leaves, and filled the air with their sweet scent.

2. “You see in this ‘walk’ that the trees are not very evenly placed,” said Mr. Hill. “That is because men did not plant them.”

“Then how did they get there, Uncle?” asked Fred.

“I will tell you how a pimento walk is started,” said Mr. Hill.

3. “A planter sets apart a piece of land close to where pimento-trees are already growing, and

allows weeds and bushes to overrun it. In a year or two plenty of young pimento-trees are found among the plants that spring up.”



Pimento (All-spice)—Foliage, Flowers, and Berries.

4. “But how were the seeds planted?” asked the boys.

“They were sown by the birds, which are very fond of pimento berries, and fly off with many of them, afterwards dropping the seeds. Some of these grow and take root.

5. “At the proper time, the grower clears away

all the plants except the young pimento-trees that he chooses to keep. Of course he has to wait a few years before he can gather a crop from them."

"When will the berries be ready on these trees that are now in bloom, Uncle?" asked Harry.

6. "In September," was the reply. "They are not left to ripen, but are picked while green.



Clove.



Nutmeg.

When ripe they are a glossy black colour, and have a sweet and spicy flavour.

7. "I will tell you how the picking is done. A lad climbs the tree, breaks off young branches, and throws them down to women and children, who strip off the berries.

8. "These are spread out in barbecues for the sun to dry or 'cure' them, after which they are put into bags ready to be shipped away. But

they are not green then; the drying turns them brown, as well as hard."

9. Some people call pimento *allspice*," said Harry.

"Yes," said Mr. Hill, "and sometimes it is called Jamaica Pepper. It tastes like a mixture of other spices—cinnamon, cloves, and nutmegs,—and that is why allspice seems a good name for it."

Mr. Hill told the boys that the clove and the guava belong to the same family of plants as the pimento.

TOBACCO.—I.

1. Mr. Hill was smoking a cigar on his way home with the boys from St. Ann's parish, and perhaps that was what led Fred to say:

"You have never told us anything about the plant from which we get tobacco, Uncle."

2. "No," replied Mr. Hill. "All the plants and trees we have talked of are grown for the sake of the food they give us. The tobacco plant, as you know, is not a food-plant."

3. "The use of tobacco has now spread to all parts of the world, so that to grow and prepare enough of it gives work for many thousands of people. There is nothing else from the plant-

world, except tea, that is used in so many countries and by so many people.

4. “It is strange that from the two plants most widely used in the world, the part made use of from both is the *leaf*. In the one case the leaf provides us with the means of making a nice drink; in the other, it gives us a luxury.”

5. “What is that, Uncle?”

“It is something that is pleasant, but not really needful,” said Mr. Hill.

6. “The people of Europe did not know of tobacco until Columbus found out the ‘New World’. Just over 400 years ago, when he came to the West Indies, he saw some of the people smoking leaves which were rolled up like a cigar. They were the leaves of what we now call the tobacco-plant.

7. “It was not until nearly 100 years after that time that the people of England learnt from Sir Walter Raleigh how to smoke.

8. “There is a tale told about Sir Walter and the tobacco. After his return home, his servant



The Tea-plant.

one day went into the room while he was smoking, and, thinking his master was burning, he threw a pail of water over him to put out the fire."

TOBACCO.—II.

1. "If you want to see the fields of tobacco-plants, you had better visit Temple Hall," said Mr. Hill.

2. "You know that as a cigar burns it leaves a great deal of ash. Whatever this is made of has been taken out of the soil by the growing plant. So you may be sure that, where tobacco-plants grow, the ground quickly becomes poorer and poorer. They are greedy feeders, taking very much plant-food out of the earth, and a light soil, which has in it the remains of plants that have rotted, suits them best."

3. "What are the tobacco-seeds like?" asked Fred.

"They are as small as grains of sand, and are plentiful," said Mr. Hill. "The seed-vessel in which they grow is a *capsule*, and this bursts into holes when the seeds are ripe, to let them out.

4. "It is the leaves, however, that we value, and every planter tries to get them to grow as large as he can, and, at the same time, such as will give good tobacco after they have been cured.

5. “The full-grown plant has a round, upright stem, taller than you, and branching towards the top. Except when the seed is wished for, the



Tobacco Plant—Flower and Leaf.

end of the stem with the flower-bud is nipped off before the plant has time to bloom. About twelve or fourteen leaves are thus left to grow to full size.”

“Do they grow better if the flowers are picked off?” asked one of the boys.

6. “Oh, yes!” replied their uncle. “For the same reason the planter has all the side-shoots picked out too; so that all the food the plant takes up may go to build up the leaves.

7. “Each plant has to be looked to several times, that its young side-shoots may be picked off as fast as they appear. And the caterpillars must be picked off too.”

“Would they eat the leaves, Uncle?” asked Harry.

8. “Yes, very quickly. Twice a day they must be searched for. They try to get out of sight by crawling on the under part of the leaf, but as they are large they may be easily seen.”

“What are they like, Uncle?” asked Fred.

9. “The one that does most damage is green; if not killed it would, in time, change into a large sphinx moth.

“When the leaves are quite ready, the stems are cut, and the leaves well dried.”

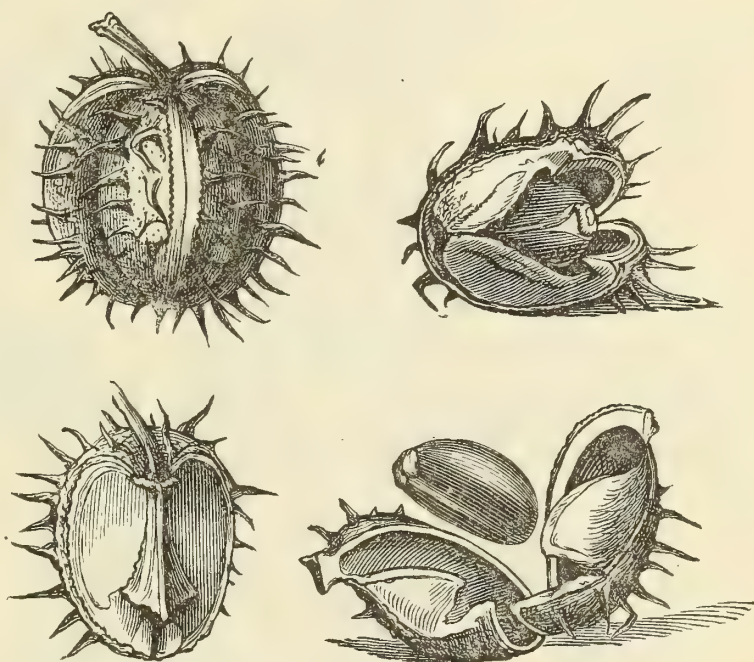
“I suppose they are fit to be smoked then,” said Fred.

10. “Oh, no!” said Mr. Hill. “They have yet to be cured, or they would be no better than dried weeds for smoking. But the curing is a troublesome business, and I must tell you how that is done another day.”

THE CASTOR-OIL PLANT.

1. Almost everyone knows the pretty speckled seeds of the castor-oil plant. They grow in a husk which, when ripe, splits open and shows the three chambers in which the seeds grow. When the husk splits, it mostly does so with great force, so that the seeds are shot off some distance from the plant that bore them.

2. This is the way that some plants manage to keep their seedlings from crowding too near each other, that they may have room to grow. The castor-



Castor-oil Seeds, closed and open.

oil seeds, however, are so useful to us that we try to gather them before the plant is quite ready to scatter them.

3. The castor-oil plant is common in the West Indies, and we all like to see its beautiful palm-shaped leaves. They are large, with at least seven “lobes” or parts, spreading out something like the fingers of an outspread hand. Have you

ever traced the thick rib which passes down each of the seven lobes? All the ribs meet together at a point near the middle of the leaf, where the stalk joins it.

4. The plants grow so fast that, when they are



The Castor-oil Plant.

about four months old, some of them have seeds ready for gathering. As the flower-stalks spring from the branches, the grower nips off the top of the chief stem, to cause the plant to branch well.

5. As soon as the seed-vessels begin to turn brown the spikes are cut, and carried away to

dry. As they dry, the husks burst and shoot out their seeds, which are then collected, that the oil may be taken from them.

6. In the West Indies this is often done by boiling the crushed seeds in water. This draws the oil from them, and as it will not mix with the water, but floats on the top, it can be easily skimmed off.

7. But in Europe and America the oil is pressed out by machines, and is then called “cold drawn” oil. This is liked better than the kind that is drawn out by heat.

8. You know that castor-oil is a drug, and that it is often used to make us better when we are ailing. It may also be put to other uses; such as for burning in lamps, for oiling machines, and for the making of soap. As a lamp oil it burns slowly, gives a good white light, and is safe.

THREE USEFUL VEGETABLES—YAMS, COCOES, AND SWEET POTATOES.—I.

1. Before Fred and Harry Brown ended the visit to their uncle, they learnt many things about yams, cocoes, and sweet potatoes—three vegetables which form a large part of the food of people living in the West Indies.

2. Of course the boys had often eaten the tubers; but they had taken very little notice of the plants when they had seen them growing, for no one had ever talked about them as their uncle did.

3. He would say sometimes, "You will never be good planters when you are men, if you do not understand the habits of your plants, and know what soils suit them best."

4. Mr. Hill wished the boys to observe how unlike each other the plants of yams, cocoes, and sweet potatoes are in the parts above ground.

"What sort of stems have they?" he asked them.

5. "The yams and sweet potatoes have slender stems," replied Fred.

"Yes, too slender to hold themselves upright," added his uncle. "So what do they do?"

6. "The yam twines its stem round a stake or anything else that is near it," said Harry.

7. "And the sweet potato stem creeps along the ground," his brother added.

"Very well. Then one is a climbing, and the other a trailing stem," said Mr. Hill; "and as the long stem of the potato trails along, it sends out roots and tubers at every joint that rests on the ground.

8. "The coco plant, on the other hand, seems

to have no stem at all, its leaves being held on high by very long stalks."

"They are very pretty leaves, Uncle," said Fred. "Their shape is just like a large arrow-head."



The Sweet Potato Plant and Roots.

9. "They act in a pretty way too," remarked his Uncle. "I think you know that all plants give off water from their leaves, although we cannot see the water passing away. The coco plant not only does this in the usual way, but from the tips of its leaves it sends off extra drops, which we

may see. They shine like little beads, and prove to us that the plant is at work."

10. "The plant must use up a great quantity of water, I think," said Harry.



The Coco Plant.

"It does," his uncle replied. "I think you can judge for yourselves that it is likely to do best on soils that have plenty of moisture for it, if only they are not too clayey. I ought to tell you that 'tania' is the common name for this plant in some parts of the West Indies."

YAMS, COCOES, AND SWEET POTATOES.—II.

1. Mr. Hill next spoke to the boys about the veins in the leaves.

“All the three food-plants of which we are talking have net-veined leaves,” he said. “I speak of that because it is odd that the yam and coco should have such leaves. They belong to the great class of plants with one seed-leaf, and those plants, like the corn, usually have their leaf-veins side by side, as I think you already know.”

2. Mr. Hill then told the boys that although some cocoes have their leaves green, and others rather purple, the tubers of both kinds are alike. He showed them, too, that the chief kinds of sweet potato may be known by the leaf, which is round and in one piece in the white kind, and parted into lobes in the red.

3. When they asked about the different kinds of yams he said: “There are the white, negro, afou or yellow, and Indian yams. The last, also called Yampi or Yampee, has its leaf in three leaflets, and bears small round tubers, which are generally white inside, but sometimes of a deep-purple colour; the others have heart-shaped leaves, and very large white or yellow tubers.

4. “You saw the men planting some yams a

few days ago," he added. "Tell me how they did it."

"They cut the plant away from the tubers, and put it in the ground," said Harry.

5. "Yes; but that was only the first step. Soon a number of plants will bud from the top of each head that was planted, and then the men will cut them away, and place them in the ground one by one."

6. The boys wanted to know if that was the way to plant sweet potatoes. So Mr. Hill told them that those plants are raised by cuttings taken from the growing stem.

7. "The sweet potato plants bear crops after three or four months," he said. "When the tubers are dug, if the soil is again thrown over the roots and stems, a second crop will grow in a short time."

8. "But you must bear in mind, boys, that, if we wish for good crops, something more must be done than just to put the plants into the ground. The land must be tilled over and over again, to let in the air and the rain, and to break up the clods."

9. "Lazy people may say that there is no use in tilling, because heavy rain afterwards washes away the soil. But rain will not wash away as much of it as it would if we do not till."

10. "Tilling the soil loosens it to some depth, so that the rain sinks in, and therefore does not wash away the top soil as much as it does when the ground below is quite hard. Besides, when the air and water get into the soil they make fresh plant-food from it."

11. The boys could not stay to see the men plant out the yams, for the next week they had to return home. They were sorry to leave their uncle, who had taken so much trouble to teach them and to make them happy, and they hoped they might visit him at Annotto Bay again the next year.

CASSAVA.—I.

1. If you have ever been in a market you must have seen the great heaps of vegetables that are taken there to be sold. Amongst them are cocoes and yams, sweet potatoes and cassava; all of which were once growing in the darkness of the soil. They do not look as tempting as the pretty, juicy fruits which have grown in the sun's light and heat, but they are even more useful than those.

2. I dare say you like to eat cassava cakes, but did you ever think how much trouble some one must have taken to prepare them, and how

much work the plant must have done in making the large tubers from which we get the meal.

3. I should like to tell you something about this work. The cassava plants are reared from cuttings, and they send up their thin, knotty stems higher than a tall man. Their leaves are large, and are divided into about five narrow parts, which meet at the stalk, and spread out like fingers.

4. It is the roots, however, which we think most of, for they are storehouses of food.

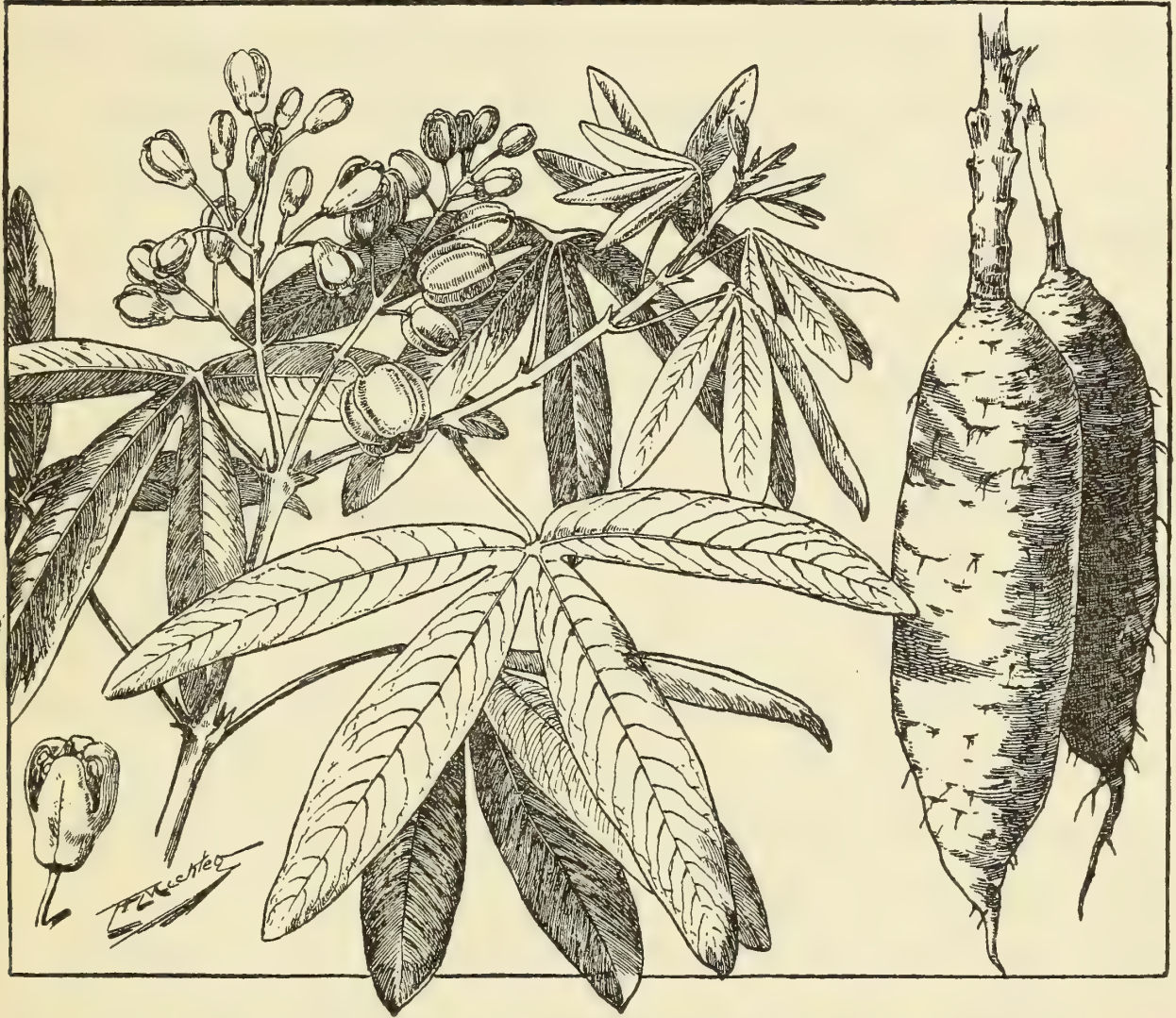
It is the plant itself that prepares this food. Within its leaves it makes starch out of what it takes from the water and the air. Then it sends so much of this starch down to its roots that they swell out into large tubers.

5. If we did not disturb the plant, in course of time it would draw up for its own use the food which it has saved up. We, however, are glad to take it for ourselves.

6. There are two kinds of cassava—the bitter, and the sweet. The bitter cassava does not become soft when boiled, and that is one way by which we know it from the sweet kind. Except for some tough parts in the centre, the sweet cassava gets quite soft if boiled, and may then be eaten as a vegetable, like potatoes.

7. Meal may be prepared from either the bitter or the sweet cassava.

In the juice of the bitter kind there is a poison which causes death. Yet it is bitter cassava that



The Cassava Plant and its Roots.

is mostly grown for making meal, because it yields more tubers than the sweet kind. Fortunately, we know how the poison may be easily got rid of. We have only to heat the juice, and the poison is driven off.

CASSAVA.—II.

1. I will tell you how the meal is prepared. You know that every part of a plant is made up of tiny bags, or cells. In the cassava root these cells are full of juice and starch, and as we wish to keep the starch and get rid of the juice the cells must be burst. This is done by grating the tubers.

2. In this way the cassava is ground into a pulp, which is then pressed to squeeze out the juice. What is left behind is *cassava-meal*, and it is plain that it is made up of starch and the broken cells.

3. The meal has to be well dried by heat, in large flat pans, to get rid of any juice that was not pressed out. Sometimes the moist meal is made into round cakes, which are dried on hot plates or tins over the fire.

4. Now let us see what may be done with the juice that was squeezed out. If we allow it to stand for a time we shall find that it carried off some of the starch, for this settles to the bottom. We have then to pour away the juice, and we get *fine cassava starch*, of which a very good food, called *tapioca*, can be made.

5. I will tell you how. To make tapioca we heat the cassava starch on hot plates. The heat makes

the little grains of starch swell and burst, and afterwards they stick to each other, forming the rough, white lumps of tapioca.

6. Even the poisonous juice of the bitter cassava can be used after it has been poured away from the starch. By boiling this juice for a long time most of the water in it will pass away into the air. What remains will become thicker and thicker as the boiling goes on, until it looks something like molasses.

7. This we call *cassareep*, and we use it in making sauces; or we boil it with meat, or fish, and other things, to make the well-known dish of “pepper-pot”, which many people enjoy so much.

ANNATTO.

1. “Here are some seeds that are put to a use we have not yet spoken of in our talks about plants,” said Mr. Scott to his class at school. “I have just shaken them out of this bristly husk, and if you count them you will find between thirty and forty of them. These small annatto seeds all have a red, waxy coating over them, and that is the part which we use.

2. “More than 400 years ago, the men from Europe who first went to America and the West

Indies, found that the natives made a very strange use of these red seeds. They smeared their faces



The Annatto Plant, with Flowers and Fruit.

and bodies all over with the colour which they got from the waxy pulp. You see by this that annatto has been used as a dye for a very long time. It gives different shades of red and yellow,

and we use it to stain butter, cheese, soaps, and candles, or to dye silks, wool, feathers, and other things.”

3. Mr. Scott found that some of the children knew the annatto, and could describe it. They told him that it was a shrub—that it bore heart-shaped leaves, and bunches of pinkish or white flowers.

4. “The annatto shrub will grow almost anywhere, except in very wet places,” said Mr. Scott; “but it gives best crops when it grows in rich soil. As cattle, horses, and goats will not eat the leaves, the annatto is often planted upon hilly pasture-lands.

5. “In a year and a half from the time of sowing seeds, the first crop will be ready, and the shrubs will yield more year by year, for several years.

6. “The fruit is gathered as soon as the husks begin to open, and the seeds are then taken out, and well dried, that they may not become mouldy after they are packed. No doubt you can tell me what will be done with the seeds in the end.”

“The waxy part will be taken off,” said one of the boys.

7. “Quite right,” said Mr. Scott. “And sometimes this is done here, in the West Indies; the pulp being pressed into cakes or rolls before it is sent away. Sometimes, however, the seeds are

shipped to England, and the work is all done there.

8. “There are different ways of doing the work. Mostly the seeds are soaked in water until the pulp comes off, and the seeds are then strained away. In time, the dye settles down to the bottom of the water, which can then be poured off. The dye is next dried and pressed, and after the rolls or cakes have been wrapped round with plantain leaves, they are packed in casks, and sent off to England or elsewhere.”

LOGWOOD.—I.

1. After a few days Mr. Scott showed the children in his school some chips of a hard and dark-red kind of wood.

“These chips are from another tree that gives us a useful dye,” he said. “I might get some of the dye from these pieces; for it comes from the wood, not from the seeds as in annatto.

2. “These are chips of logwood, and they will stain water a deep reddish-brown colour if they are soaked in it. In this way we get a dye that is much used for colouring silks, wool, leather, and other things, and for printing pretty patterns on calico.”

“Is the colour always the same?” asked one of the boys.

3. “We may get many shades, varying from pale-blue to blue-black,” said the teacher. “The more wood we use the darker the dye becomes.



Foliage of the Logwood Tree.

And men have found out how to change the dye into different colours, by adding other things to it.”

Most of the boys knew the logwood trees, for some grew not far away from their school.

4. They knew that the leaf has eight or ten leaflets, growing in pairs on the leaf-stalk, and

that the flowers come in small spikes at the end of the branches. They knew that the seeds grow in pods, and have little “wings” on them which make them very light. And they had often seen the seeds carried off by the wind, as they fell from the ripe pods.

In this way many of the seeds are sown, so that it is always easy to obtain young trees.

5. During the rainy season the seedlings are dug up, and planted where they are to grow. Sometimes they are placed in a row, and, as their young boughs grow close together and overlap each other, they form a good hedge.

LOGWOOD.—II.

1. “It is the trunk of the tree that is of most use to us,” said Mr. Scott. “Here is a slice of logwood, which I have had cut that you may see what part of the wood is used.

2. “At the outside you see a ring of dark, rough bark. The wood close to it is softer and of a lighter colour than the rest, and is the youngest part of the trunk. This part is called the *sap-wood*, and the inner and harder part is the *heart-wood*.

3. “See what happens when I drop this piece of heart-wood into a bowl of water.”

“It sinks,” said one of the boys.

4. “And what does that prove to you?” asked his teacher.

“That the wood is heavy,” replied the boy.

5. “Yes, it is a very heavy wood. Now look at this piece which has been polished. How pretty it is! Because of its rich colour and the good polish it takes, logwood is sometimes used in making pretty furniture.”

6. After the children had looked well at the wood, the teacher went on to say:

“I was once at Black River, in the parish of St. Elizabeth, and there I saw great piles of logwood, ready to be shipped off to England. The tree trunks had been cut into short pieces about five feet long, and all the bark and sap-wood had been chipped off.

7. “At the dye-works in England the logs are cut up into very small pieces, so that the dye may be easily drawn out.

“In some parts of Jamaica, where the logwood trees have been cut down, men dig up the old woody roots, for even these will give the dye.

8. “It is nearly two hundred years since the logwood tree was brought to the West Indies from Honduras, where it grows in plenty. Now, chiefly from the seeds scattered by the wind, there are many logwood trees in Jamaica. They grow

over large parts of the moist coast-lands, and even in some of the higher parts of the island.

9. "The tree easily takes root, and grows fast, being ready for felling when it is from ten to twenty years old. But it makes the best wood when growing where the soil is rich and moist."

SOME FAMOUS TREES.

THE CEDAR.

1. The West Indian Cedar is a high tree, from which we get a most useful kind of wood. Its leaves are made up of leaflets set in two rows, like the leaves of the acacia and logwood.

2. Its flat, winged seeds are easily borne by the wind, and sown; yet, although there are very many full-grown trees in the island, there are but few young ones.

3. Where the land has been taken for pen-keeping, the seedlings do not have a chance to live long. When they spring up, something should be put round them to keep the cattle from destroying them, so that there may be some cedar-wood in the island when the old trees are used up.

4. For making small things for common use most timbers are too hard and heavy. Those

woods that are not so are often too soft and spongy to be strong.

5. Now the cedar is not only light, strong, and easy to cut, but it has beautiful markings, and a nice scent. For these reasons it is much prized and sought after.

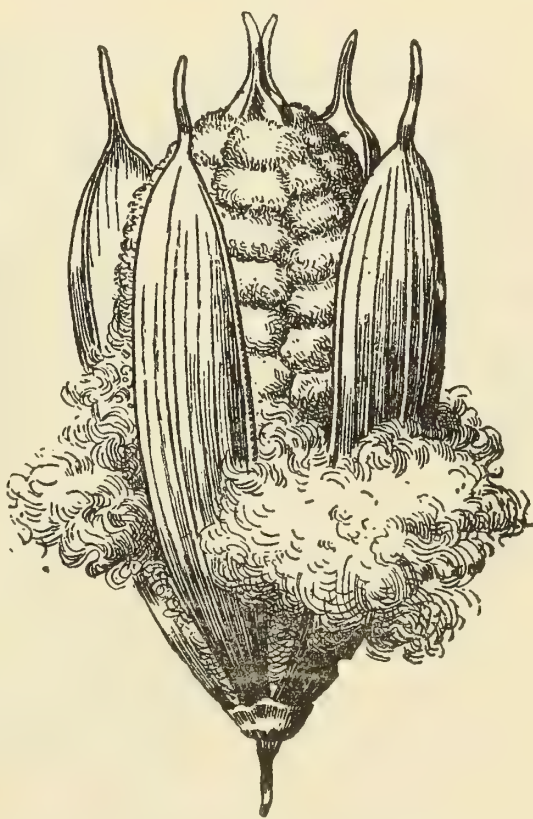
6. It lasts for a long time, and it is very much used for shingles and the inner parts of houses, and for making furniture, cigar boxes, and fancy articles.

THE COTTON TREE.

7. Dotted here and there, in most parts of Jamaica, may be seen a grand but strange-looking tree. From its seed-pods hang long masses of white down, from which it gets its name of "Cotton Tree".

8. Its leaves spread out like the fingers of a hand, and are borne aloft on large and spreading branches that twist and curve into queer shapes.

9. Its trunk is formed in a strange way, for at the lower part it sends out large flat growths of wood, called buttresses. These curve along the



Seed-pod of "Cotton Tree".

ground, as if to help the roots to hold up the tall, stout stem.

10. The wood of the cotton tree is soft and light, but if steeped in strong lime-water, it will last for several years. Sometimes it is sawn into laths for the roofs of houses.

11. The downy covering of the seeds is different from the true cotton that grows on the cotton plant. It may be used for stuffing beds; but, on the whole, the cotton tree is more handsome than useful.

THE CABBAGE PALM.

12. Amongst the beautiful trees which are the pride of the West Indies we must reckon the noble Cabbage Palm, whose tall form rises high above most of the other trees. Its heart leaves are very good for eating as a vegetable, but taking out the bud of growing leaves of course kills the tree, because, as in other palms, the growing bud at the top is the only one that it has.

THE GUANGO.

13. Another famous and useful tree is the Guango, well known for its long seed-pods, which are eagerly eaten by horses and cattle, and prove a very fattening food for them.

14. Guango trees give a good shade in pastures, as their branches are large and spreading, while their stems, though very thick, are short. Their leaves fold up at night so that the dew forms under them; and by day they spread out so as to give shade.

SUMMARY.

PART I.—ANIMAL LIFE.

THE BAT (p. 9).

Description.—The bat is a "*hand-winged*" animal. It has large ears, and is covered with fur. Its senses of hearing and feeling are very keen. From its sides a skin spreads between its long finger-bones and its hind legs, forming wings. The wings are folded when not in use.

Habits.—Bats go abroad at dusk; by day they rest, hanging head downwards by the claws of their thumbs. Some feed on fruits; others on insects.

THE CAT (p. 11).

Description.—The cat is a *flesh-eating* animal. Its short round jaws have teeth for seizing and cutting, but none for grinding or chewing. Its tongue is rough. Each fore-paw has five toes, and each hind-paw has four. All the toes have claws, which can be drawn back into sheaths. Soft pads are at the bottom of the feet.

The cat can see, smell, and hear well. The pupils of its eyes appear only as a thin slit when the light is bright, but they enlarge in a dim light.

Habits.—Cats are fond of raw flesh and fish, and will catch birds and mice for food. They prowl noiselessly about on their padded feet, or creep softly along, or climb by their claws in pursuit of their prey.

THE RAT (p. 15).

Description.—The rat is a *gnawing* animal. Its front teeth are curved, and have flat sharp edges. These teeth keep on growing as fast as they are worn down. The rat has a long head, bright

eyes, and a coat of fur. By means of the claws on its toes it can climb well. There are gray, brown, and black rats. Mice, rabbits, and beavers belong to the same family.

Habits.—Rats live in the floors, ceilings, and walls of houses, or in holes in the ground. They are very fierce. They eat almost all kinds of flesh, and plants; and, in doing so, often clear away refuse that might be hurtful to health if it were left. Much damage is done to the sugar-canes and other crops by the rats.

THE HORSE (p. 18).

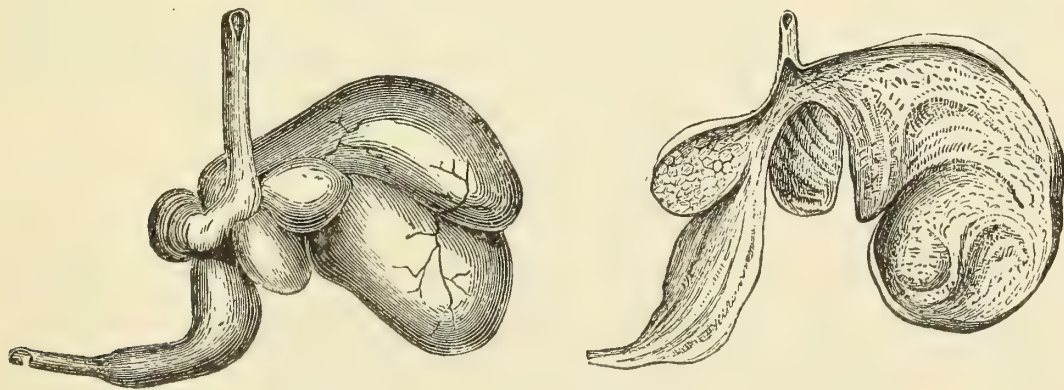
Description.—*Build*: long skull and jaws, broad chest, arched neck, large eyes, short and pointed ears, strong and slender legs. *Hoofs*: like the mule and the ass, the horse is a *single-hoofed* animal, having only one toe on each foot. The soft part under the hoof is called the “frog”. There are six cutting *teeth* in the front of each jaw; the same number of grinding teeth on each side at the back.

Habits.—Horses are *grazing* animals, and are gentle and obedient when trained. Wild horses live in troops in some countries.

Uses.—Horses, mules, and asses are trained to draw or carry loads. They should be well fed, and never treated unkindly. The ass is very patient, and is sure-footed in rough and hilly places.

THE COW (p. 22).

Description.—The cow is a *cloven-hoofed* animal and a *cud-chewer*. It has four toes on each foot, but two of them are too



Stomach of the Cow.

short to reach the ground. In the front its upper jaw has a pad instead of teeth; the lower jaw has eight cutting teeth in front.

The grinding teeth are large and flat, for crushing the grass. Its stomach is not a single bag, but has four chambers.

Habits.—The cow is slow in its movements. It needs quiet rest, that it may “chew the cud”.

The food is first passed into the *paunch*, or first part of the stomach. From this it passes slowly to the second part, where it is made into small pellets or *cuds*. When the animal is at rest it forces these pellets up into its mouth, one by one, to chew them well. Afterwards they are swallowed into the third part of the stomach, from which they pass on to the fourth.

Uses.—For drawing loads; for their milk; and for their flesh (beef). Their dead bodies also supply us with materials from which leather, knife-handles, glue, candles, &c., are made.

MILK AND BUTTER (p. 25).

Milk is full of little bags of fat. When left at rest the fat-bags float to the top and form cream. From this butter is made.

Butter.—The little bags of fat are burst by churning, and the fat is set free to form butter. The part of the milk that remains is called *butter-milk*. Milk will turn bad if put into a vessel that is not quite clean. When it is soured, *curds* are formed in it, and from these in most countries *cheese* is made.

THE MANATEE (p. 28).

Description.—The manatee feeds its young on milk as the cat and the cow do. Although it lives in the sea it breathes by *lungs*. It has a tough, hard, uneven skin, and very small eyes. The fore limbs take the form of flippers, or swimming paddles; these are fitted with nails, by which the creature drags itself along.

Habits.—The manatee comes to the surface of the water to breathe. It feeds on water-weeds, which it tears up with the hard bristly pads in the front of its mouth.

THE DUCK (p. 30).

Description.—The duck has *webbed feet*, and is a water bird. On land it waddles along, because its legs are so far back. Its feathers are dressed with an oil, so that they do not become soaked with water. Short, soft feathers, called down, grow close to its body for warmth. Down is thickest on its breast.

Habits.—The duck feeds on slugs, worms, insects, and water-

plants. It uses its broad bill to find food in the mud. A kind of fringe on its bill acts as a *strainer*, letting out the water and mud, and keeping the food in. Large flocks of wild ducks live in marshy places by the sea.

LIZARDS (p. 33).

Description.—A lizard is a *reptile*. It has cold blood. Its body is long, and is covered with scales that fit closely over it. The legs (when present) are short. Most lizards have four legs, but some are without legs.

Habits.—They have pointed teeth, and feed on flies and other insects, and are very quick in their movements.

CROCODILES (p. 35).

Description.—The crocodile is a large *reptile*. It is very much like an alligator, and that name is sometimes given to it in mistake. Rows of bony plates cover its body. Its jaws are very large, with sharp, pointed teeth. The nostrils are on a lump at the end of the snout.

Habits.—The crocodile drives itself through the water by swinging its powerful tail; by its tail, also, it can knock its prey into the water. It sometimes basks in the sun on the river-banks, and its eggs are laid in marshy places, or buried in the sand. Often the eggs are eaten by the mongoose, by birds and other creatures. Crocodiles have lungs for breathing. They raise their nostrils above water to get air.

TADPOLES AND FROGS (p. 38).

Tadpoles are hatched from frog's eggs, which are laid in jelly-like clusters, called spawn. Tadpoles live only in water; like fishes, they have *gills for breathing*. They feed on the water-weeds, and grow into little frogs. Their gills get smaller, until they disappear; while lungs grow. Four legs also appear, and the tail shrinks away.

Frogs.—When the tadpole has become a young frog it leaves the water for the land. But it returns to the water sometimes, for it is web-footed and a good swimmer. It can also remain under water for a long time. On land it can leap well, on account of its long hind legs. It delights in wet and swampy places.

Slugs and insects are the frog's food, and these it swallows whole, for it has no chewing teeth. Both air and water can pass in through the pores of its skin. It *breathes by lungs*, and gulps down the air which enters at the nostrils.

THE SHARK (p. 44).

Description.—The shark, like all other fishes, has a backbone and *cold* blood, and breathes by *gills*, not by lungs. The water enters by the mouth and runs out over the gills. In the gills the fine blood-vessels are spread out, so that the blood may be made fresh and pure by the air that the water contains.

Like other fishes, also, the shark has *fins* for swimming, and *scales* for a covering. The skin is rough and strong, and the scales are hard and horny.

The shark has a thick, fleshy tail, by which it drives itself along swiftly. Its mouth is wide, and is set with many rows of teeth.

Habits.—It is a fierce and greedy fish, and very strong. It feeds on other fishes, and is also able to seize a man and kill him.

BEES.—I. (p. 46).

Kinds.—In each hive there are: (1) *The queen*, which is larger than the other bees, and lays the eggs; (2) *the drones*, which have no sting, and are killed, after a time, by (3) *the workers*. The workers are smaller than the drones, and have stings. Some of them are engaged in making wax for the cells and in gathering honey; while others are employed in taking care of the eggs, in nursing and feeding the grubs, and in attending on the queen.

Cells.—The six-sided cells form the *comb*. Honey is stored in some of them; and in the rest the eggs are laid. The queen-bee lays thousands of eggs, but only one in each cell. *Grubs* are hatched from the eggs. They are fed in the cells by the nurse-bees; their food is bee-bread, made of pollen and honey. The grub changes to a *chrysalis*, from which the bee, a *perfect insect*, comes forth after about ten days.

BEES.—II. (p. 49).

Swarming.—Sometimes the queen leaves the hive, followed by a swarm of bees. Then a young queen-bee takes her place.

Stores.—The walls of the cells are made of wax, and in the cells the bees store the honey which they make from the sweet juices of the flowers. The bees form “bee-bread” from the yellow flower-dust which clings to their hairy legs.

Wasps.—Wasps build nests on trees or in the ground. The nests are made of mud, or of wood chewed into a kind of paper. Wasps do not store up food as bees do.

SPIDERS (pp. 51, 55).

Description.—The spider is not an insect, for it has *eight* jointed legs, and insects have only six. Besides, its body is in only *two* parts, the head and chest together forming one part, and the belly (or abdomen) the other. Again, insects have wings, spiders have *not*. Spiders are hatched from eggs, and are perfect spiders from the first.

The jaws of spiders hold a poison, with which they kill their prey. Many spiders have *spinnerets*; from these they pour out a juice, which at once hardens into silky threads.

Habits.—Of the silky threads *webs* are made. Some spiders make flat round webs to entrap insects, others spin long threads in the grass. The gossamer spider drifts through the air at the end of its long threads; the trap-door spider lines a hole in the ground with its silk, and goes forth from this hiding-place to hunt for prey. Many spiders lay their eggs in bags made of the silken threads.

The Scorpion is in the same class of animals as the spider. It has a ringed body, and eight legs. At the end of its body is a kind of claw, with which it stings. It has a pair of nipping claws for holding its prey, and is covered with a horny shell.

CRABS AND LOBSTERS (p. 57).

Description.—Crabs and lobsters are jointed-limbed animals, as insects and spiders also are. They have ten legs, the front pair having large nipping claws. They are covered with a hard crust, or shell. Crabs are often described as “short-tailed”, and lobsters as “long-tailed”. But what is thus called the “tail” is really the belly (or abdomen). The lobster has a broad fin at the

end of its body, which it uses in swimming. It has also small "swimmerets" under its body.

Habits.—Land-crabs live in boggy places, and in mountain crevices; but once a year they go down to the shore to let the water wash the eggs from their body. Crabs and lobsters are very fierce, and will even kill and eat each other. When a crab or a lobster outgrows its shell, it casts it off, and hides until a new shell forms.

THE EARTHWORM (p. 60).

Description.—The earthworm has a long soft body, formed in *rings*. Each ring has eight stiff hairs on it, by which the worm draws itself along, or clings to the sides of its hole. An earthworm has a mouth; but it has neither teeth, tongue, eyes, feet, nor bones.

Habits.—Earthworms swallow the mould of decayed plants, and find food in it. They also feed on the leaves and straws which they drag into their holes.

LITTLE WORKERS (p. 62).

Earthworms loosen the soil, and let in light and air, by making burrows through it. By their "casts" they bring fresh soil to the surface of the ground. Many of the leaves dragged down by them rot in the soil, and help to make fresh food for the plants.

Ants also help to till the soil. These little insects dig hollow places, and in doing so they bring fresh earth to the air, and cause it to be well mixed. They destroy the wood of fallen trees, and so hasten their decay. They also carry into the ground pieces of plants, which in time become changed into good soil.

THE SNAIL (p. 65).

Description.—The snail is a *soft-bodied* animal, but its body is not "ringed". Snails are hatched from eggs. As the creature grows it makes its shell larger and larger by adding to the edge of it. A fold of loose soft skin, called the *mantle*, covers its body. The mantle gives out moisture, with lime in it; this lime hardens to form the shell. The flat under-part of the snail's body is called the *foot*. On the head are four "horns" or feelers, which can be

drawn back at will. The two longer of these bear the eyes at their tips.

Habits.—Snails seek moist places, and some kinds live in the water. Land snails and slugs do much harm by feeding on the leaves and stems of growing plants. Many birds find snails choice morsels; and in some parts of the world even people eat them.

PART II.—PLANT LIFE.

PLANTS (p. 68).

Two Kinds.—Plants are either :

- (1) *Flowering*, bearing flowers and seeds; or
- (2) *Flowerless*, having spores instead of seeds, as ferns.

A flowering plant has root, stem, leaves, flowers, and fruit.

Plants **feed, breathe, and grow.**

They *feed* by (1) their *roots*, which take up moisture and plant-food from the soil; and by (2) their *leaves*, which take in gases from the air. They *breathe* by their *leaves*, which take in one gas and give out another.

Uses.—Plants supply us with:

- (1) *Food and medicine.*
- (2) *Fibre* for making clothing, rope, mats, &c.
- (3) *Wood*, for houses, furniture, tools, &c.
- (4) *Dyes* of lovely colours.

ROOTS.—I. (p. 72).

Kinds.—(1) *Tap-roots*, as in the coffee and carrot. In these, side branches spring from the main root. (2) *Fibrous roots*, as in corn. The chief root-fibres start from the end of the green shoot.

Root-hairs grow in great numbers on the young root-threads or fibres. With end protected by a kind of cap, the *root-hairs* push their way through the soil and take up the plant-food.

ROOTS.—II. (p. 75).

Thickened Roots.—Some plants lay up a store of starchy food in their roots, on which they feed while bringing forth their

flowers and seeds. This is what causes the roots of the carrot, beet, and cassava to grow thick. Roots like the roots of the cassava are called *tuberous roots*.

Most roots are hidden in the ground. But in some plants roots start from the joints of the stem, and grow wholly or partly in the air; as in the corn, screw-pine, five-finger, and some of the palms.

Uses.—Roots keep the plant firmly in its place, and they also take up food for it.

STEMS AND SHOOTS.—I. (p. 78).

Stems and Roots.—Stems grow from buds; and they bear buds, from which leaves, flowers, or branches grow. Roots *never* have buds.

Uses.—Stems support the leaves and flowers, and by the stem the food is carried from one part of the plant to another.

Kinds of Stems.—Some grow *above ground* in the light and air. These either die down after the plant has fruited, or they grow woody, and last for several years. Some plants, *e.g.* the strawberry, send stems, called *runners*, along the ground. Others, like the bamboo, the banana, yams, and cocoes, have stems as well as roots *underground*. From these green shoots sprout upwards to the air. Others again have very short stems surrounded by layers of leaves, forming *bulbs*.

STEMS AND SHOOTS.—II. (p. 82).

Forms of Stems.—Stems are of many forms. We have:

- (1) *Upright*, and *woody* stems; as in trees.
- (2) *Climbers*; which climb by tendrils (as in the English pea), or by small roots (as in the five-finger).
- (3) *Twiners*; which coil or wind around supports, as yams.
- (4) *Runners*; as in the strawberry.
- (5) *Rhizomes*, or root-stocks; as in the banana.
- (6) *Tubers*; as in yams, cocoes, and the Irish potato.
- (7) *Bulbs*; as in the onion, which has a very short stem covered with thick fleshy scales.

Rhizomes, tubers, and bulbs are *underground* stems.

Some stems are round, others square; some smooth, others covered with prickles or hairs; some jointed, some not; some hollow, others filled with pith or wood.

Woody Stems.—Some grow by rings of new wood between the older wood and the bark. In these the hardest wood (called *heart-wood*) is near the centre. Others, like the palms, grow by fresh wood forming in the centre of the stem. These have no bark, and have the hardest wood at the outside.

LEAVES.—I. (p. 86).

Kinds.—Leaves are *simple*, as in the banana and coffee; or *compound*, as in logwood. Some *simple* leaves have *lobes*, as in the castor-oil leaf. *Compound* leaves are so called because they have several leaflets, as in tamarind, English pea, and cotton-tree.

The leaflets of compound leaves grow either on each side of the chief stalk, or spreading out like the fingers of a hand.

Stalk and Blade.—Some leaves have a blade only, which sheathes around the plant-stem, as in corn. Others have both blade and leaf-stalk.

LEAVES.—II. (p. 89).

Shape.—Leaves are variously shaped, some like an egg, others like a heart, and so on; and the edges of some are even, and of others uneven.

Surface.—The surface of some leaves seems smooth and shiny, while the surface of others being covered with hairs is rough, and the edges of others are furnished with sharp spines.

Veins.—Leaves have *ribs*, or *veins*. These spread the leaf out, and carry sap to all parts of it. The one passing through the centre is the *mid-rib*. Leaves are either (1) *Straight-veined*, as in corn, bamboo, banana; or (2) *Net-veined*, as in cocoes, coffee, mango.

FLOWERS.—I. (p. 93).

Calyx.—The calyx is formed by the *sepals*, which are mostly green. But in some flowers, as in orchids and lilies, the sepals are of other colours. The sepals do not always join, nor is their number always the same. Each kind of plant keeps to its own number.

FLOWERS.—II. (p. 96).

Corolla.—The corolla is formed by the *petals*. The sepals and petals cover and protect the inner parts of the flower. They also attract insects by their bright colours or sweet scents. After a while the *petals* drop off, but the *sepals* often remain even when the fruit is full grown.

FLOWERS.—III. (p. 98).

Stamens.—The *stamens* are near the centre of the flower. Each stamen bears an *anther*, which is a small case, holding *pollen*. The pollen is carried from flower to flower by bees and other insects, and by humming-birds.

Pistil.—When *sepals*, *petals*, and *stamens* have been removed, there remains, just in the middle of the flower, the *pistil*. This holds, at its lower part, the beginnings of the seeds.

FRUITS (p. 101).

The fruit is the *seed* and its *covering*.

Fruits are known by different names according to the different ways in which the seed is covered and protected.

The chief kinds of fruits are :—

1. Berries—with seeds loose in the pulp, as in the orange, grape, and gourd.

2. Drupes (“stone-fruits”)—with a juicy pulp around the “stone” or woody case which holds the seed, as in the mango.

3. Nuts—dry fruits that do not burst open to let out the seed, as the cocoa-nut and cashew-nut.

4. Pods and Capsules—dry fruits that open, when ripe, to let out the seeds ; as in the tamarind (*a pod*), and the poppy and cinchona (*capsules*). Capsules differ in shape.

5. Compound.—Fruits are called compound when many little fruits are massed together, as in the pine-apple.

SEEDS (p. 105).

A **Seed** holds—(1) the beginning of a plant ; and (2) a store of food for the young plant. In some seeds the food is stored in the seed-leaf ; in others it is placed around the young plant.

Seed - leaves.—Seeds have either (1) *one* seed-leaf, as in palms, corn, and all grasses ; or (2) *two* seed-leaves, as in the bean, coffee, and mango.

Flowering Plants.—Flowering plants are arranged in two great classes:—(1) Those that have only a single seed-leaf ; and (2) those with a double seed-leaf.

THE BAMBOO (p. 108).

Description.—The bamboo belongs to the family of grasses. The plants in this family have *fibrous* roots, *jointed* stems, which are hollow except at the joints, and long *sheathing* leaves, with their veins *side by side*.

The bamboo has an underground stem, which sends up shoots to a great height. These form a thick cluster.

The *wood* is light and strong, and is easily cut or split into useful pieces. Its outside part is hard and lasting ; it is also smooth, clean, and shiny.

Uses.—Too various to be named. The wood is valued because of its strength, lightness, and beauty.

CORN (p. 111).

The Plant.—Corn, or maize, is more widely grown in the world than any other grain, except rice. It is a large *grass*, and has therefore fibrous roots, jointed stems, and sheathing leaves with straight veins.

The Flower.—The tassel of flower at the top of the plant drops its pollen upon the spikes of flowers springing from lower parts of the stem. Then it dies off, and the flower spikes below it grow into ears of corn, in which the cob is set with rows of seeds.

The Seed.—The colour of the seeds, and the number of rows of seeds on a cob, differ in different kinds of plants. The seeds are good for food while green and juicy ; but they are mostly left to ripen and grow hard.

THE SUGAR-CANE.—I. (p. 113).

Growth.—The sugar-cane also belongs to the *grass family*. “Plant-canes” are reared from cuttings, which are taken from the tops of healthy, growing canes in spring and autumn. When about

a year old they bear large tufts of feathery blossoms. A little later the canes become dry and smooth outside, and their juice turns sweet and sticky. Then they are fit to be cut.

From the *stool*, or part left in the ground, fresh canes grow, called *ratoons*. If the canes are to thrive the ground must be kept loose and free from weeds, and caterpillars and other pests destroyed.

THE SUGAR-CANE.—II. (p. 116).

The Juice.—At the mill the canes are crushed between iron rollers. The juice is thus squeezed out and drains into a tank. It is then made to flow into “receivers”, where, after lime has been added, it is heated. Soon a scum forms, and by skimming this off the juice is cleansed.

Next, the juice is boiled in open pans until it thickens. Then the grains of sugar form from it as it cools. In this way we get *Muscovado* sugar. That part of the syrup which will not “grain” is known as *molasses*. It drains through the holes in the bottom of the hogsheads in which the syrup is “potted”.

COFFEE.—I. (p. 118).

The Beans. — After the berries are gathered their pulp is cleansed from the beans, which are then known as *parchment* coffee. The beans are then *cured*. That is, they are skinned and well dried, until they become hard and brittle, and of a deep green colour. Unless the “curing” is well done, the coffee will not sell for a good price.

Before being used in making the well-known drink, the beans are *roasted* to bring out their pleasant taste, and then *ground* to a coarse powder.

The leaves are dark green and shiny, the flowers white, and the ripe berries of a dark red colour. Two seeds, or “beans”, lie within each berry.

COFFEE.—II. (p. 120).

The Tree.—The coffee-tree is reared from seed. When three or four feet high it is “topped”, to keep it low and spreading. Rows of bananas are often planted amongst the young trees for shade.

Much pruning has to be done to let the light and air get to all parts of the tree. Insect pests must be sought for and cleansed away when they appear.

COCOA (p. 124).

The Tree.—Cocoa-trees grow well in sheltered spots, where the soil is deep. Bananas are used as shade plants for the young trees. Large seed-pods grow on short stalks from the stems and branches of the cocoa-tree. When ripe the pod is *cut* off; it should not be pulled or twisted. The pods are gathered twice a year, at Easter and at Christmas, though the trees bear, more or less, all the year round.

The Beans.—Within the pod are several beans, packed in rows in the pulp. These have to be heaped in a close room for a few days to *sweat* them, so that the pulp can be cleansed away. They are then well *dried*. Afterwards they are either broken into *nibs*, or prepared in other ways for use in making cocoa, or chocolate.

THE ORANGE.—I. (p. 126).

The Fruit is a large berry, with *rind*, *pulp*, and *seeds*.

The rind is oily, and strongly scented. The cells of the pulp are large, and easily seen. The seed has a tough, leathery skin, and two “seed-leaves”. The fruit must be *cut* from the tree,—not pulled. It is then sorted into sizes, wrapped in paper, and packed in boxes. The least bruise will cause the fruit to rot.

THE ORANGE.—II. (p. 129).

The Tree.—The orange-tree belongs to the same family as the lime, citron, shaddock, and lemon. It thrives well in the West Indies, and has long roots, which give it a firm hold in the soil. If overhung by other trees, its stems grow weakly, and its fruit is small and sour. In the West Indies trees are usually raised from seed; but it is a good plan to bud or graft sour orange-trees. The scale insect is its chief pest.

THE BANANA (p. 130).

The **Banana**, with its large spreading leaves and tall stem, is often used as a shade plant. It has an underground stem, which sends up many leaf-shoots. All but three or four of these should be cut away. The sheathing ends of the large leaves build up the stems of the green shoots. The plant grows fast, and becomes very handsome. Its bunch of flowers is protected by a sheath, which

falls off when the fruit is ready to form. The fruit grows in large clusters, and is good for food.

The **Plantain** is very similar to the banana. Its fruit is a useful vegetable; but it requires cooking.

THE PINE-APPLE (p. 133).

The Plant.—Its stem is very short, and its leaves stiff, with strong spines on their edges. Its flowers are blue, and crowded together on a spike. From them grows a large fruit, with a tuft of green leaves above it. The seeds are very small, and lie close under the skin.

How Grown.—The green tuft or fruit-crown may be planted. Or suckers may be cut away from the plant. Many pine-apples are grown in the Bahama Islands.

The Crop.—The fruit should be cut before it becomes ripe if it is to be shipped. It must be gently handled while being cut, wrapped up, and packed, as bruised fruit very soon rots.

THE MANGO (p. 136).

The Tree is large, with simple, shiny leaves and small flowers. It readily grows from seed, and is common throughout the island.

The Fruit is a “drupe”, having an outer skin, a very juicy pulp, and a large “stone”. It is often picked while green, and is then preserved before being shipped off.

THE COCOA-NUT PALM (p. 139).

The Tree.—The cocoa-nut palm is tall and without branches, and has a crown of large feather-like leaves. It grows best on the sea-shore. The stem is usually curved and twisted; its outer part being hard, and its centre soft.

Cocoa-nut palms are reared from seed, and are about five years old before they flower. When they begin to bear fruit, they yield it all the year round.

The Fruit has (1) the outside rough fibres, or *coir*; (2) the hard shell; (3) the white hollow kernel, which holds the cocoa-nut milk, a sweetish liquid furnishing, before the fruit is ripe, an agreeable drink.

Uses.—No other plant in the world provides us with so many useful things. From it we get:

- (1) *Wood* for building, and other uses. It is called *porcupine* wood.
- (2) *Leaves* for thatching, and for baskets and mats.
- (3) *Fruit* for food and drink.
- (4) *Oil* for making soap and candles, and for use in lamps.
- (5) *Coir* for ropes, mats, and brushes.

THE BREAD-FRUIT (p. 142).

The Tree.—The tree grows to a large size, and has long, wide, and smooth leaves of a bright green colour. It bears two kinds of flowers, but only one kind gives the fruit. Its wood is soft, with a milky, sticky sap, which may be used as a cement. It yields fruit for several months of the year.

The Fruit.—The fruit is very large, with a thick, fleshy stalk and a rough, green rind. At first the inner part of the fruit is white and mealy, something like pith; in ripening it turns juicy. The fruit should be gathered while mealy, and baked before it turns soft.

THREE COMMON FRUITS (p. 144).

1. Guava.—The chief kinds are the white, the red, and the mountain guava. The *white* guava is a low tree, with simple leaves and white flowers, and a fruit rather larger than a hen's egg. Its fruit has a thick, yellowish rind, and a pinkish pulp holding several seeds. Guava jelly is made from it.

2. Star Apple.—This tree has slender, spreading branches, with pretty leaves that are dark-green above and a golden colour beneath. Its fruit is filled with a jelly-like pulp, which holds a number of black seeds.

3. Cashew.—A handsome tree, whose wood is red and rather hard. The nut grows on a thick, fleshy stalk, which is very nice for eating when ripe. The shell of the nut has a thick black oil which will blister the skin. The ripe kernels are eaten after being roasted.

GINGER.—I. (p. 147).

The Plant.—The *leaves* of the plant are long, pointed, and sheathed. Leafy *shoots* three or four feet high, bear spikes of small yellow and purple flowers. The *underground stem* is strangely

shaped, spreading out into many roundish parts. These are the *races* or *hands*, which are of use to us.

How Grown.—In March or April pieces of the root-stock are planted ; in the following January or February the crop is ready. Ginger takes up a large amount of plant-food from the soil. If pieces of the root-stock be left on the ground when the crop is dug, ratoons will grow from them. But the ginger from the ratoons will not be so good as that from the first plants.

GINGER.—II. (p. 149).

Preparation of the Crop.—The “hands” are *scraped*, to clear off the dark outer skin. They are then washed, great care being taken not to break off the “toes”.

Afterwards they are *dried* for six or eight days in the sun. After drying has been begun, the ginger must not be wetted again or it will spoil.

The ginger is then *packed* in bags or barrels.

Preserved Ginger.—For preserving, the underground stem must be young and soft. Pieces of it are scalded and peeled, and then well soaked in syrup. The preserved ginger is put into jars, which are afterwards closely corked.

PIMENTO (*Allspice*) (p. 151).

The Tree.—The pimento grows about thirty feet high, with smooth light bark, simple shiny leaves, and small white flowers. The fruit is a small berry, which is black and glossy when ripe. The berries are a favoured food of birds, and many young trees spring up from the seeds which the birds have dropped.

The Spice.—About September the berries are picked, while green. They are then dried in barbecues until they become brown and hard. They are often called “Allspice”, because they taste like a mixture of other spices.

TOBACCO.—I. (p. 154).

Uses.—Tobacco is not a food plant. We cannot even prepare a nice drink from it as from tea. It is purely a luxury ; yet except tea no other article from the vegetable world is so widely used.

History.—It was discovered by Columbus 400 years ago ; and its use was introduced into England 100 years later by Sir Walter Raleigh.

TOBACCO.—II. (p. 156).

The Plant.—The *Root* is large, long, and fibrous. The *Stem* is upright, tall, round, and branching near the top. The *Leaves* are large, pointed, and hairy. The *Seeds* are very small and plentiful.

How Grown.—The tobacco plant is raised from seed, but, after the first cutting, crops may be gathered from ratoons. The plants take very much plant-food from the soil. They grow best in a light soil, which has plenty of decayed leaves and plants in it. The caterpillar of a large moth feeds on the leaves and spoils them, if not sought for and killed.

The Crop.—The leaves are cut when ripe. Then they are dried, and afterwards cured.

THE CASTOR-OIL PLANT (p. 159).

The Plant grows to a bush or small tree. Its handsome leaves have from seven to eleven lobes. Three-cornered husks contain the seeds of the plants, which grow so fast that on some of them the seeds are ready when the plant is about four months old.

The Seeds are prized for the oil they contain.

This is drawn from them in two ways:

(1) By *boiling* the crushed seeds in water; then the oil floats to the top.

(2) By *squeezing* the oil out by machines which press and crush the beans. This is the better way.

The Oil is used:

- | | | |
|---------------------------|--|--------------------------|
| (1) As medicine. | | (3) For oiling machines. |
| (2) For burning in lamps. | | (4) In making soap. |

YAMS, COCOES, AND SWEET POTATOES.—I. & II. (p. 161).

Yams.—The chief kinds are:

- | | |
|---|---|
| (1) The white; | } with heart-shaped leaves and very large tubers. |
| (2) The negro; | |
| (3) The afou or yellow; | |
| (4) The Indian; with leaves in three leaflets, and with small round tubers. | |

Yam plants are reared by putting into the ground the head that has been cut away from the tubers. This head sends out several young shoots, which may be cut away and planted out.

Cocoos are the tuberous roots of a plant, which has a very short stem, and arrow-shaped and net-veined leaves with long stalks. Fresh plants are raised in the same way as yams. Cocoos form one of the chief foods in the West Indies.

Sweet Potatoes.—The stem of the plant trails along the ground, and at every joint sends out roots which bear tubers. The chief kinds are:

- (1) The *white*; with round leaves.
- (2) The *red*; with leaves in three lobes.

New plants are raised from cuttings. The crop is ready after three or four months. If the roots and stems are then covered with mould a second crop will soon grow.

Tillage.—By tilling the ground we let in light, air, and water, and break up the clods. By these means food in the soil is made ready for the plants. Well tilled soil is not washed away by rains as much as soil in which rain cannot sink.

CASSAVA.—I. (p. 167).

The Plant.—The cassava plant has large leaves, with from three to seven parts meeting at the top of the stalk. Its roots are large and juicy. They hold a large store of starchy food.

Bitter Cassava roots are yellowish, and have a *poisonous* juice. They do not turn soft when boiled.

Sweet Cassava roots are reddish, and are tough in the centre. These turn soft when boiled, and are eaten as a vegetable. Their juice is *not* poisonous. Meal is prepared from both the bitter and the sweet cassava.

CASSAVA.—II. (p. 170).

The Food.—Cassava Meal is prepared from both kinds of roots. It is made by grating the roots, squeezing out the juice, and then drying (by heat) the meal that is left. From this meal cassava cakes are made.

Cassava Starch.—This settles to the bottom of the juice that has been squeezed out from the grated tubers.

Tapioca is prepared by heating cassava starch until the starch-grains swell and burst. Then they stick together, and form the small rough lumps of tapioca.

Cassareep is made by boiling the juice of the bitter cassava root. The boiling drives off the poison, and causes the juice to thicken.

ANNATTO (p. 171).

The Plant.—The annatto is a shrub with bunches of heart-shaped leaves and pinkish flowers. Horses and cattle will not eat the leaves. The seeds grow in prickly husks, and have a waxy covering, which gives a good dye.

The Dye.—After the husks are gathered, the seeds are cleared out of them and well dried, that they may not turn mouldy when packed. The waxy part is cleared from the seeds by soaking them in water. Then the seeds are strained away, and the pulp settles to the bottom. When the water has been poured off, the pulp is dried, pressed, and made into “rolls” or “cakes” for shipment.

The dye gives many shades of red and yellow. It is used for colouring butter, cheese, soap, &c.; and for dyeing silk, wool, &c.

LOGWOOD.—I. (p. 174).

The Tree.—This has compound leaves with eight or ten leaflets, small yellow flowers, and small seed-pods. The seeds are “winged”, and are easily carried by the wind. Logwood, well pruned, makes a good hedge. The moist coast-lands of Jamaica suit it well.

The Dye.—This is drawn out of the wood by soaking it. The dye gives many shades of blue; and, by adding other things to it, different colours may be made.

LOGWOOD.—II. (p. 176).

The Wood.—The *bark* is dark and rough. The *sap-wood* is whitish, and the *heart-wood* red. The roots and the heart-wood are shipped away, and from them dyes are prepared. The wood is heavy, and is handsome when polished.

History.—It is nearly two hundred years since the logwood was introduced into Jamaica from Honduras. The tree takes root easily, grows quickly, and is ready for felling when it is from ten to twenty years old.

SOME FAMOUS TREES (p. 178).

1. Cedar.—The *leaves* are compound, having leaflets in pairs along the leaf-stalk. The *wood* is very useful, being light, strong,

easily cut, pretty, and scented. It is used in building, and for making furniture and small articles.

2. Cotton Tree.—This is a handsome rather than a useful tree. Its *leaves* are compound, with the leaflets meeting at the top of the stalk. Its *branches* are large, spreading, and strangely twisted. Large flat growths of wood spread out from the lower part of the trunk. The *seeds* are hidden in a mass of fine threads. The *wood*, though soft, is useful after it has been steeped in lime-water.

3. Cabbage Palm.—This is also a tall and handsome tree. Its leaves are good as a vegetable.

4. Guango.—This large and spreading tree bears long, sweet pods, that are a good fattening food for horses and cattle.

THE ANIMAL KINGDOM.

A table showing where each animal described in this book is placed in the Animal Kingdom.

1. ANIMALS WITH BACKBONES.

Bat,	Hand-winged.	}	<i>Class:</i> Mammals— suckle their young, breathe by lungs, skin is more or less hairy.	}	<i>Sub-kingdom:</i> Vertebrata (backboned animals).		
Cat,	Flesh-eater.						
Rat,	Gnawer.						
Horse,	Solid-hoofed.						
Cow,.....	Cud-chewer.						
Manatee, ...	{ With hand-like flippers, and no hind limbs.	}					
Duck,	Web-footed.						
Lizard,	{ Have scales or horny plates for covering.	}	<i>Class:</i> Birds.				
Crocodile, ...							
Frog,	{ Has two stages of life.	}	<i>Class:</i> Reptiles.				
Shark,	Breathes by gills.						
			<i>Class:</i> Amphibians.				
			<i>Class:</i> Fishes.				

2. ANIMALS WITHOUT BACKBONES.

Bee,	6 jointed limbs.	<i>Class:</i> Insects.	} <i>Sub-kingdom:</i> Annulosa (bodies formed in ring-like por- tions).	
Spider,	{ 8 jointed limbs.	<i>Class:</i> Arachnids.		
Scorpion, ...				
Crab,	{ 10 jointed limbs.	<i>Class:</i> Crustaceans.		
Lobster,				
Earthworm,	Without limbs.	<i>Class:</i> Worms.	} <i>Sub-kingdom:</i> Mollusca (soft-bodied animals).	
Snail,	{ With under part of body flattened to form the "foot".			

EXPLANATIONS OF THE MORE DIFFICULT WORDS AND PHRASES.

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- 10, 4. **framework**; the solid part which supports and gives shape to the rest of a structure.
- 11, 10. **grubs**; maggots.
- 14, 8. **'pupil' of the eye**; the apple of the eye, the opening in the eyes through which the light passes to the retina, and which usually has the power of growing larger or smaller according to the quantity of light falling on it.
- 17, 10. **ticks**; a kind of mites that attach themselves to the bodies of animals.
- 17, 11. **burrow**; to make holes under the ground to lodge in.
- 18, 2. **harness**; to put on a horse the gear by which it is yoked for work or made ready for being ridden.
- 19, 4. **sure-footed**; not likely to stumble.
- 20, 9. **scampering**; running wildly.
- 20, 10. **solid**; firm and hard.
- 21, 12. **shod**; provided with shoes.
- 23, 3. **cloven**; split or divided.
- 24, 8. **graze**; to eat or feed on growing grass.
- 25, 10. **dairyman**; a man who keeps a dairy farm.
- „ „ **pen-keepers**; breeders of cattle.
- 26, 4. **skimmed off**; taken from the top.
- 27, 6. **decay**; rot, become bad.
- 28, 3. **scales**; small thin plates which cover the skins of fishes and reptiles.
- „ „ **uneven**; rough.
- 28, 8. **curdle**; to form into a curd.
- 29, 5. **flipper**; a limb used to swim with, as the arm of a seal.
- 30, 8. **bristles**; stiff hairs.
- 31, 5. **waddle**; rock from side to side in walking.
- 32, 10. **protects it**; keeps it safe.
- „ „ **soaked**; thoroughly wet, drenched.

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- 33, 1. **gliding**; moving along smoothly and noiselessly and without seeming to make any effort.
- 34, 5. **piercing a hole**; going right through.
- 36, 6. **marshy places**; where the ground is soaked with water.
- 38, 2. **yolk**; the yellow part of an egg.
- 39, 3. **hatch**; come out of the egg.
- 39, 5. **sucker**; an organ by which an animal sticks to other bodies.
- 41, 11. **nostrils**; the holes of the nose.
- 42, 3. **pores**; very small holes.
- 42, 5. **prey**; creatures that are seized for food.
- 43, 8. **stage of life**; one of the several states in which the animal exists on its way to full development.
- 46, 9. **swiftly**; quickly.
- „ „ **tapers off**; becomes thinner and more pointed.
- 47, 1. **cells**; hollows, usually quite regular in shape, made by bees, &c., for the storing of their honey or rearing of their young.
- „ „ **sting**; a sharp-pointed weapon with which certain insects, &c., are furnished, and which they can thrust out from the under part of their body.
- 48, 8. **cocoon**; the case which is spun by grubs and caterpillars to cover themselves with while in the chrysalis state.
- 49, 1. **swarm**; the cluster of honey bees which leave the hive at the same time to seek a new dwelling.
- 49, 3. **moulding it**; pressing it into the shape required.
- 52, 1. **pounced**; leaped upon and seized with its talons.
- 57, 9. **pincers**; the nippers of certain animals.
- 60, 2. **tunnels**; underground passages.
- 60, 10. **boggy**; swampy, land soaked with water.
- 63, 5. **stiff clods**; lumps of earth that do not crumble readily.
- 65, 2. **a moist footing**; a moist place to walk upon.
- 66, 3. **slightest**; the least.
- „ „ **his self-collecting power**; his power of drawing his body in.
- 67, 10. **choice morsels**; bits of food that are greatly liked.
- 69, 9. **spores**; grains which serve as seeds in plants that do not have flowers.
- 73, 7. **rootlet**; a small root.
- „ **tender**; easily injured, not strong.
- 75, 1. **store of food**; stock of provisions that may be used when needed.

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- 81, 7. **root-stock**; underground stem.
- 82, 2. **support**; hold up, that which keeps a thing from falling or props it.
- 82, 10. **layers of leaves**; leaves laid one upon another.
- 86, 3. **blade**; the flat part of a leaf.
- 87, 4. **sheathing**; covering.
- 91, 3. **spines**; prickles.
- 93, 3. **glowing**; shining.
- 94, 4. **admire**; wonder at, and think highly of.
- 94, 5. **protect**; keep from harm, guard.
- 98, 6. **wither**; fade away.
- 102, 5. **pulp**; any soft mass—as the soft parts of fruits.
- „ „ **kernel**; the eatable part inside the shell of a nut.
- 105, 3. **hinged together**; joined by a hinge.
- 106, 3. **fleshy**; flesh-like, or pulpy.
- 110, 8. **seedling**; a young plant that has been reared from the seed.
- „ „ **transplanted**; taken from one place and planted in another.
- 111, 1. **more widely grown**; grown in more parts of the world.
- 112, 4. **cob**; the round, pithy shoot on which the grains of maize grow in rows.
- 112, 5. **mildew**; mildew is caused by a small vegetable growth, which appears chiefly in damp places or on unhealthy plants.
- 114, 6. **tufts of blossoms**; little bunches of flowers.
- „ „ **downy**; like down—which is the soft breast feathers of birds.
- 115, 7. **previous**; earlier.
- 116, 3. **receiver**; a holder, a vessel looked upon as a holder of a gas or a fluid.
- 116, 4. **a scum**; foam or froth, waste matter that rises to the surface of liquids.
- „ „ **skimmed**; cleared off from the surface.
- 118, 2. **passed**; handed.
- 118, 3. **packed**; parcelled up.
- 118, 5. **curing**; preparing for being kept.
- 119, 6. **brittle**; that will easily break.
- 119, 7. **crisp**; dry and brittle.
- 122, 1. **trailing branches**; long slender branches that hang down.
- 123, 8. **mould**; a small vegetable growth that spreads over damp substances.

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- 124, 2. **a valley**; low land between hills.
- „ „ **shaded**; sheltered from the heat and light of the sun.
- 124, 3. **in full bearing**; yielding full crops.
- 125, 5. **injured**; broken or damaged.
- 128, 9. **wrapped**; covered, rolled up in.
- 129, 1. **good flavour**; pleasant to the taste.
- 129, 5. **budding or grafting**; fixing a bud or a shoot into the wood of a tree in such a way that it will grow there.
- 130, 9. **kerosene**; a mineral oil got from petroleum.
- 132, 4. **suckers**; branches or roots starting from beneath the surface.
- 138, 3. **delicious**; extremely agreeable to the taste.
- 138, 4. **preserved**; prevented from sprouting. Fruits are preserved in sugar, or in air-tight tins.
- 140, 2. **a mass of fibres**; a number of threads matted together.
- 140, 4. **thatching**; roofing with anything like straw or reeds to protect from the weather.
- 142, 1. **a cargo**; a ship-load.
- 144, 2. **properly tended**; attended to in the right way.
- 144, 8. **a cement**; something that will cause two substances to stick together.
- 146, 4. **grain**; the markings in wood—caused by the way it grows.
- „ „ **gun-stocks**; the wooden support to which the barrel and back of a gun or rifle is fixed.
- 146, 5. **native fruits**; fruits of trees that have not been introduced from other countries.
- 147, 3. **a shoot-bud**; a bud from which a shoot will grow.
- 151, 1. **neighbouring parish**; the next or nearest parish.
- 153, 6. **glossy**; shiny.
- „ „ **spicy flavour**; tasting like spice.
- 153, 8. **barbecues**; an open floor on which coffee beans, &c., may be spread out to dry.
- 155, 6. **the “New World”**; America and the West Indies.
- 156, 2. **the remains of plants**; all that is left of them in their decay.
- 156, 3. **capsule**; a seed-vessel containing one or more cells, and opening when ripe by the separation of its valves.
- 159, 1. **speckled**; marked with small spots.
- 161, 5. **collected**; gathered up.
- 161, 8. **a drug**; something used in preparing medicine.

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- 162, 3. the habits of plants; their style and manner of growing.
166, 8. tilled; cultivated, made ready for crops.
167, 1. tempting; inviting, making one wish for them.
170, 1. prepared; made ready for use.
171, 1. bristly husk; prickly seed-covering.
172, 2. the natives; people born in the place.
178, 2. borne; carried.
178, 8. coast-lands; those parts of the country that are near the sea
178, 9. felling; cutting down.
179, 6. shingles; thin pieces of wood used for covering a roof.
179, 9. buttresses; props, or supports.
180, 10. lime-water; water into which lime has been put.
„ „ laths; thin strips of wood.

